TWO IMPORTANT FEATURES: What Combined Locks Has Accomplished with the Development of the Cram Screen for Groundwood Screening; How a Board Mill Superintendent Can Take Best Advantage of Modern Instruments.

PAPER TRADE JOURNAL

May 7, 1954

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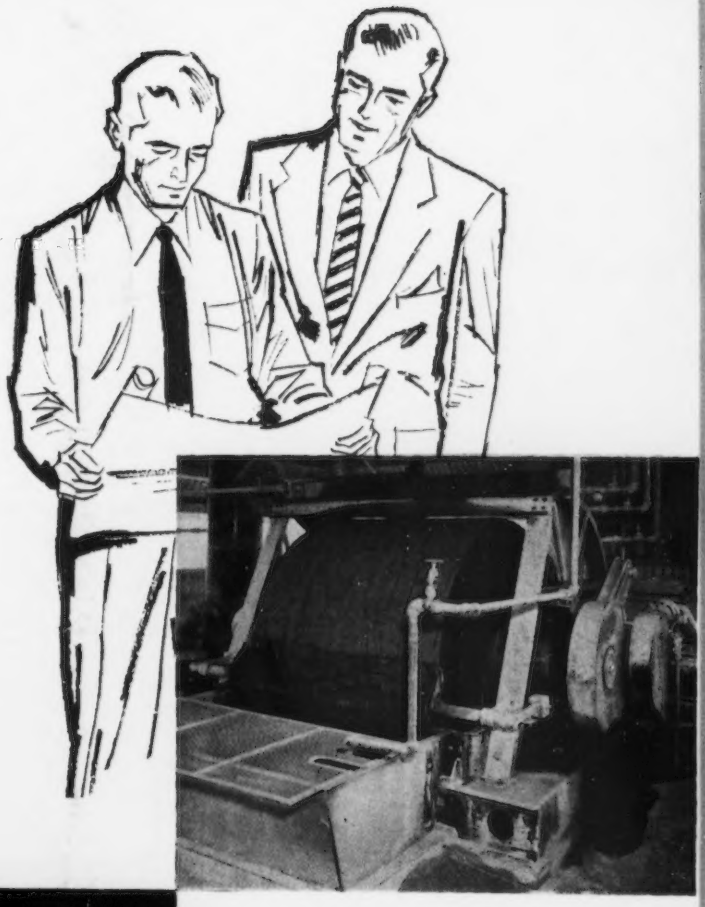

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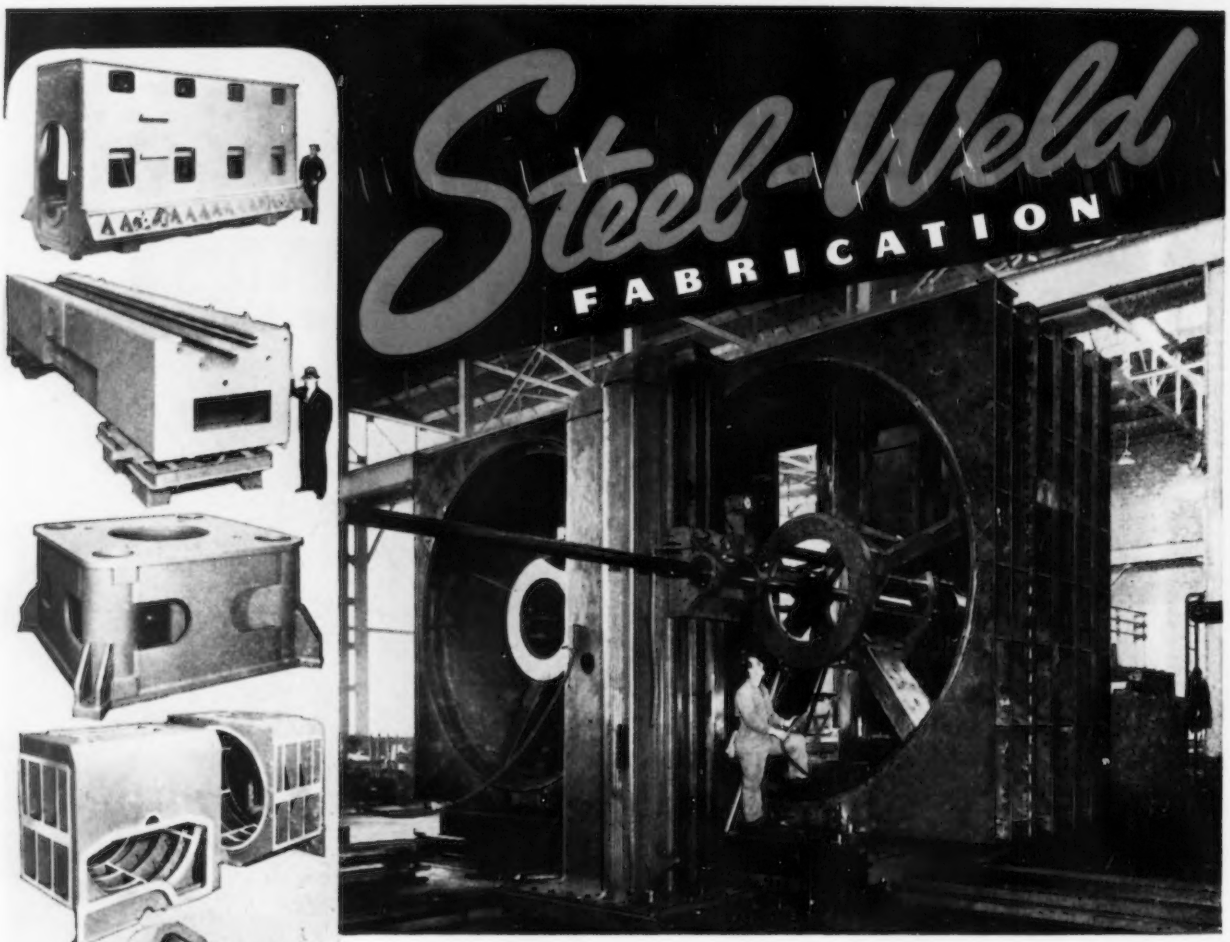

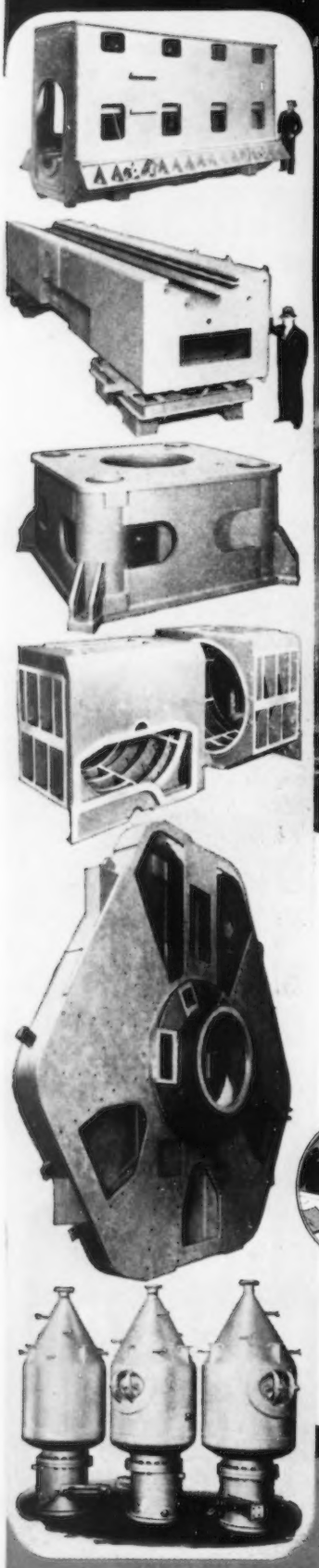

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REMEMBER THESE DATES

MAY 14-15: Research Day, University of Maine, Orono, Maine.

MAY 18: Technical Conference, Forest Products Laboratory, Madison, Wis.

MAY 20-21: Executives Conference, Institute of Paper Chemistry, Appleton, Wis.

MAY 20-22: Joint Spring Meeting, Pacific Section, TAPPI, Pacific Coast Div., APPMSA, Gearhart Hotel, Gearhart, Oregon.

MAY 23-25: Spring Meeting, National Paperboard Assn., Grove Park Inn, Asheville, N. C.

MAY 24-26: TAPPI Coating Conference, Poland Spring House, Poland Springs, Maine.

JUNE 14-17: Summer Meeting, Technical Section C.P.P.A., Empress Hotel, Victoria, B.C., Canada.

JUNE 21-23: National Meeting American Pulp and Paper Mill Superintendents Assn., Sheraton-Mount Royal Hotel, Montreal, Que.

PAPER TRADE JOURNAL

Published Weekly Since 1872

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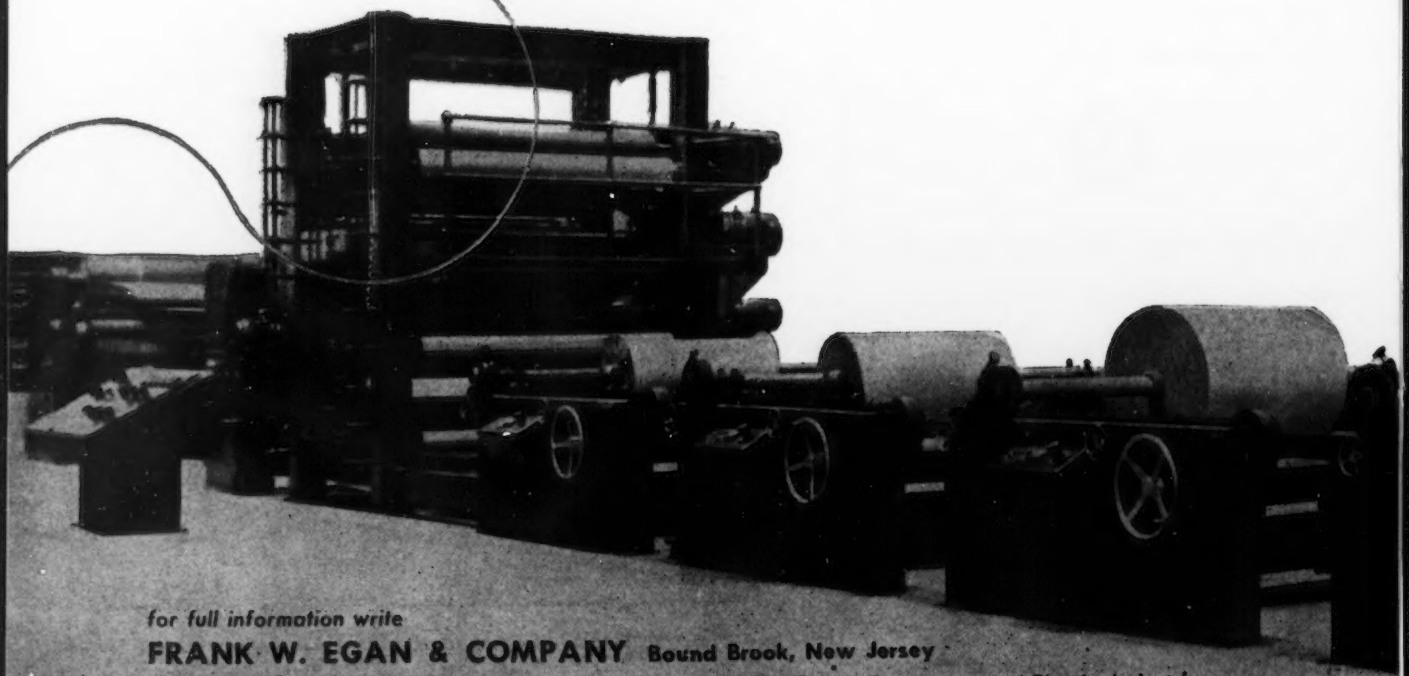

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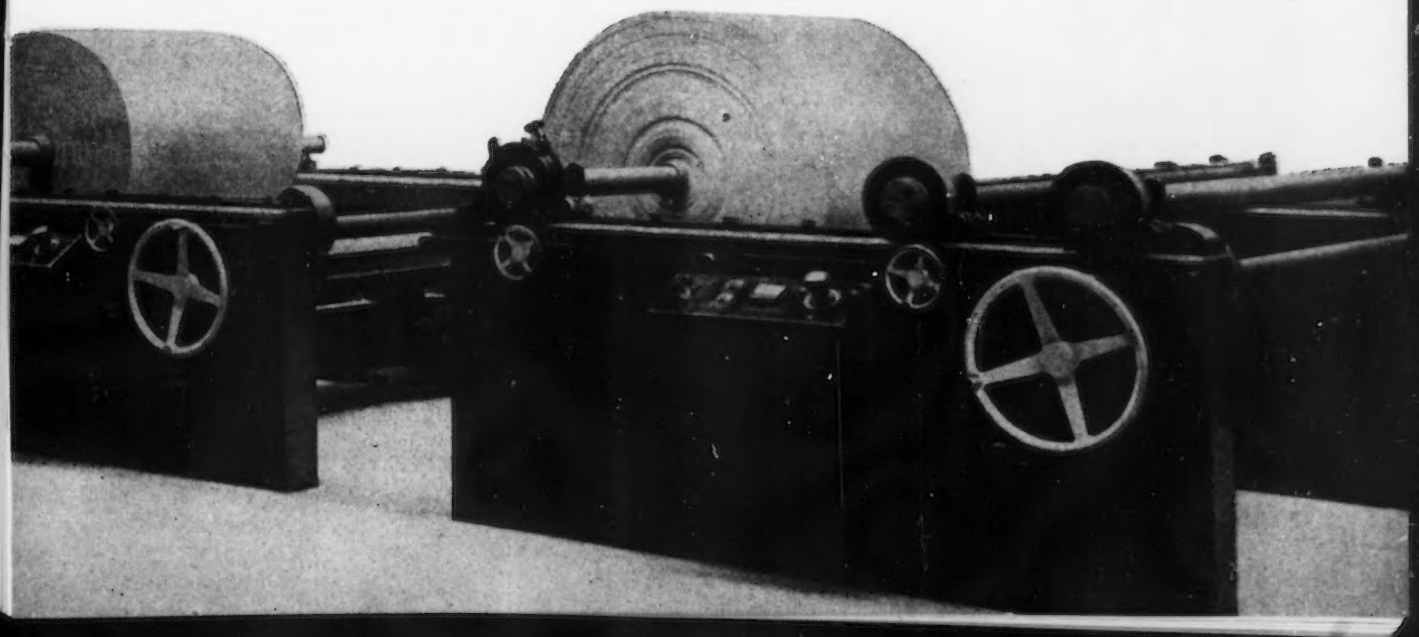

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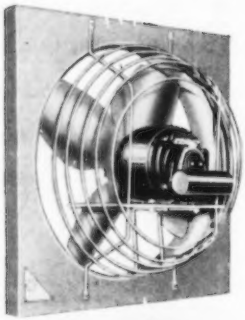
First, one of our older buildings has areas which need spot ventilation. Then, in another building, we're going to need large-capacity exhaust to get rid of dust and moisture. Finally, we need additional capacity in an old system where we've just installed some air cleaning equipment. Now, my problem is . . .



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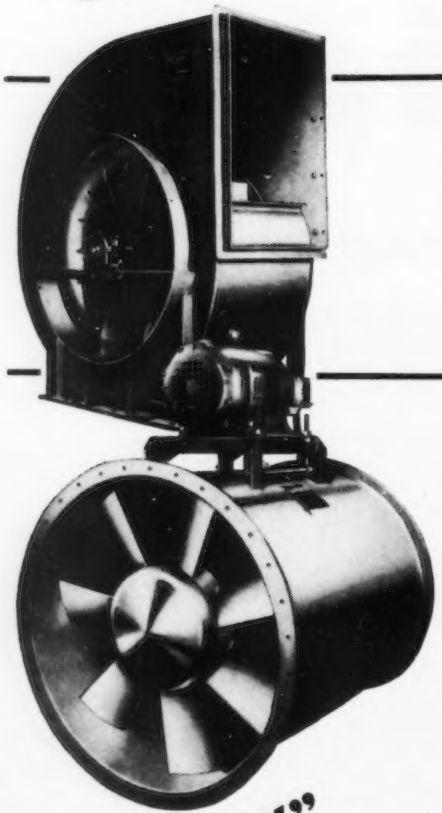
BUFFALO REPRESENTATIVE: "To begin with, no single type of fan is the best solution to *all* problems. The best and cheapest answer to your spot ventilation, for instance, is the new Type "NV" Breezo Fan. An efficient propeller fan with strong, rigid, die-formed square panel, the "NV" is simple to install in outside walls wherever you need to exhaust stale air. It can be operated free-air or duct-connected (1/4" to 1/2" s.p.) equally well. The "NV" is made in sizes for 500 to 5500, cfm capacities, and if you need larger capacity, use the new "NV" Heavy-Duty Belt-Aire, it's in sizes up to 90,000 cfm. Write for Bulletins 3865 and F-3790.



"Now, for your large-capacity exhaust system, you'll get greatest long-run satisfaction and economy with the new Type "BL" Limit-Load centrifugal fan. It's the type recommended most frequently for large systems —straight ventilation, air washer and air conditioning supply. You can't overload it, and it gives stable performance from shut-off to free air delivery. And you can pick exactly the rated capacity you need, from 1000 to 500,000 cfm, with no waste in an oversize fan or over-specified driving power. Write for Bulletin F-100.

"But where you need to step up the capacity of a system, mount an axial flow fan in a straight portion of your ductwork. The "Buffalo" Axial Flow is light, compact and takes little more space than your duct. It's extremely efficient in straight runs, and has guide vanes to keep turbulence and noise at a minimum. So you see, there is no *one* fan for all jobs. At Buffalo, we make all types and sizes, so that you can pick one that's practically tailored to your particular need. We've been building fans for 77 years, too, which means that you can be sure of any "Buffalo" fans you pick. Write for Bulletin 3533-C."

SUGGESTION: and most important of all, remember that Buffalo Engineering Sales Representatives are all technical graduates, factory trained for a number of years; they know fans and their application. Located in all principal cities, they are ready to assist you, too, in fan selection. Why not call on yours today?

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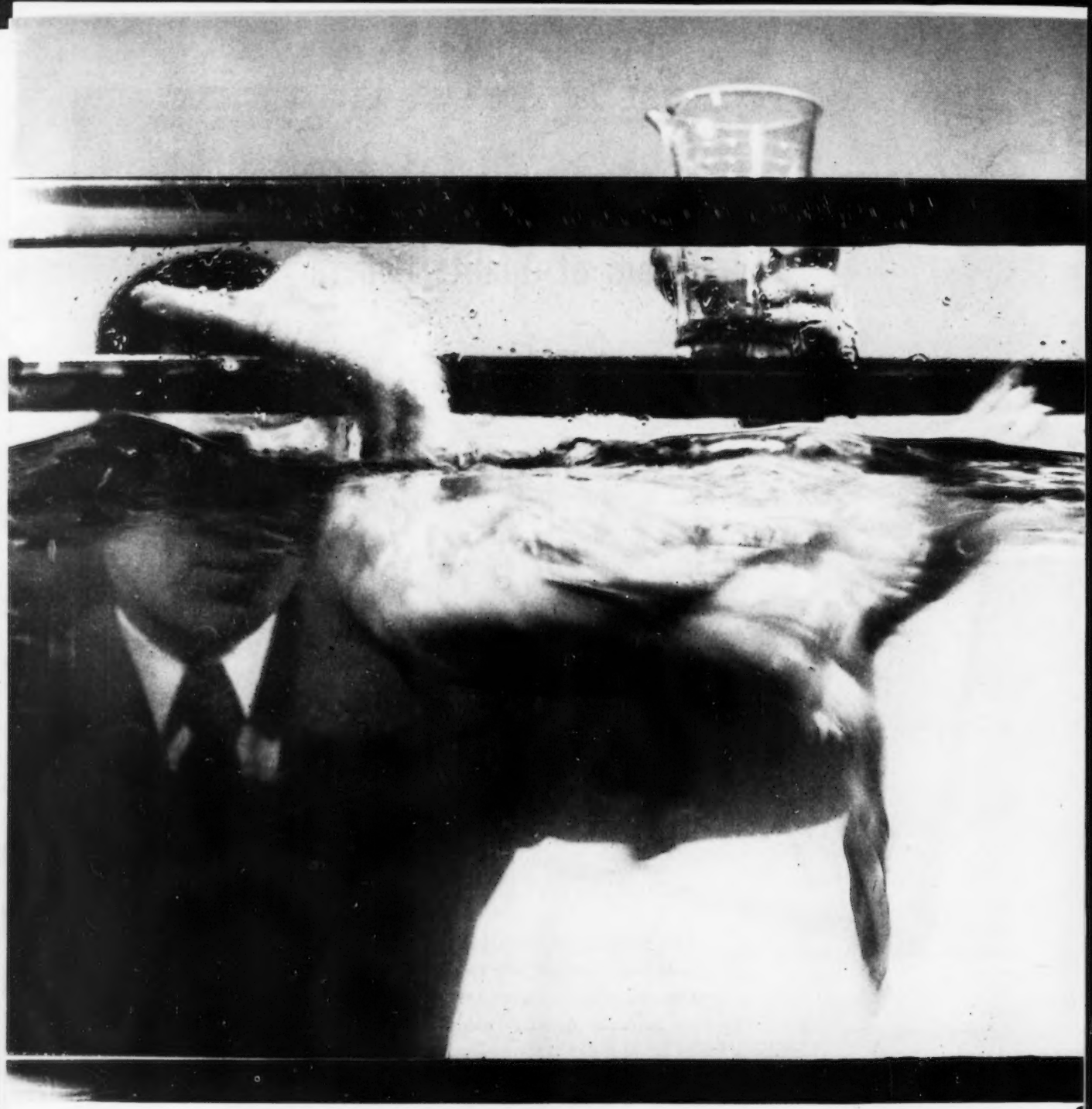
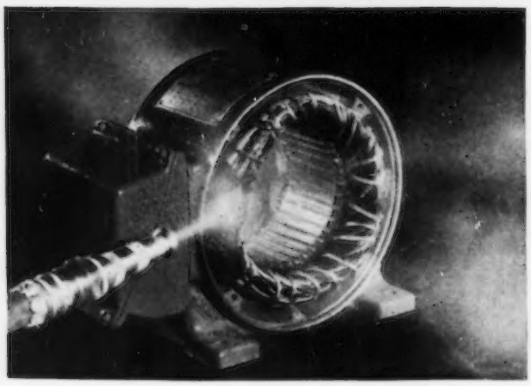




Here's a Life-Line "A" stator that has been given multiple dips and bakes of Bondite. There is no evidence of vapor penetration after being exposed to the toughest insulation test—a jet of steam.

Try tearing a piece of Life-Line's slot insulation, Mylar*. Mechanical strength is eight times greater than ordinary slot cells. Dielectric strength is ten times greater than standard design requirements.

*Trade Mark for Du Pont polyester film

There's more to motor insulation than its ability to repel water

These demonstrations show how new *Life-Line A* insulating materials provide greater protection for wire, slots and complete stator.

New and improved motor insulations are the word of the day. Actually, there is a considerable range between the run-of-the-mill "improved" insulations and the really outstanding types now available. There is only one way to judge them—by comparison.

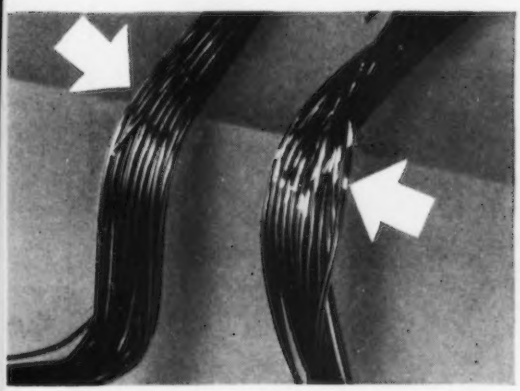
For example, many new stator insulations do a more effective job of shedding water. But Life-Line's® new Bondite goes a step further . . . it repels vapors that penetrate ordinary water-shedding insulations.

The secret is in the silicone additive that is impregnated throughout Bondite instead of being just applied as a thin outer layer. The complete story of Life-Line's Bondite, Bondar and other new motor improvements is contained in the new Life-Line Booklet B-6154. For your copy, write: Westinghouse Electric Corporation, 3 Gateway Center, P. O. Box 868, Pittsburgh 30, Pa. J-21847-A

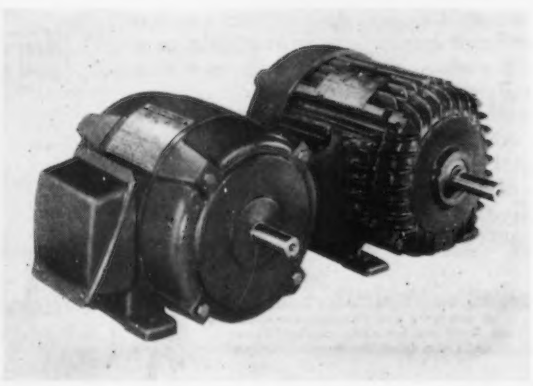
YOU CAN BE SURE . . . IF IT'S

Westinghouse

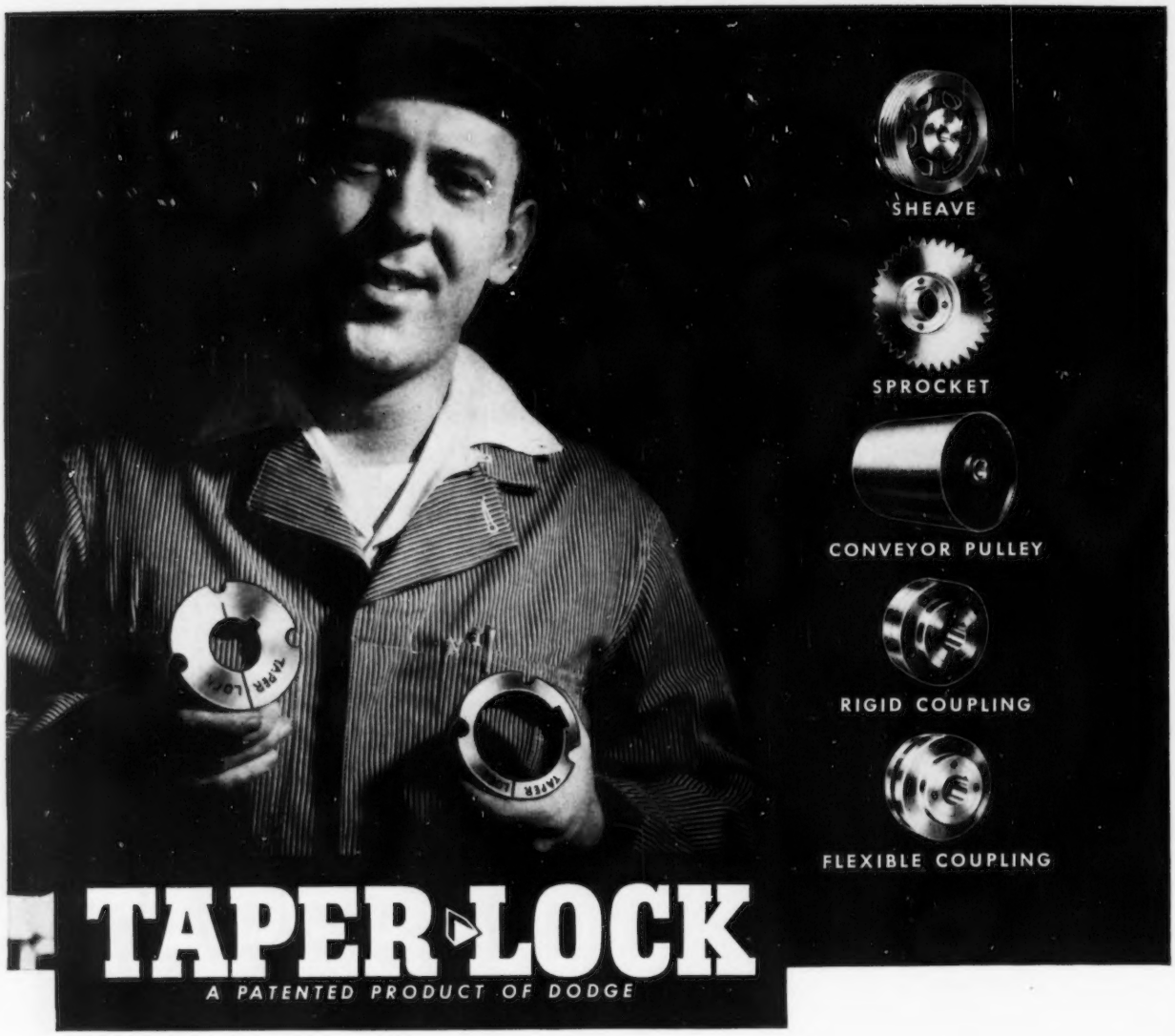
A duck's ability to shed water is only feather deep. A simple wetting agent dissolves the duck's protective coating and he sinks. Many water-shedding motor insulations react much the same; expose them to a simple solvent and they deteriorate.



These two coils have been baked for 50 hours at 400° F. Bent around a finger, the ordinary insulation on the right coil flaked off. Life-Line's Bondar insulation on the left remained intact.



Dependable performance takes balanced design. That's why *every* component in the new Life-Line "A" has been redesigned and integrated with the whole. The result is a motor with superior performance.



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a message from the publisher

Electrostatic Precipitators Play Important Role in Recovery of Paper Chemicals
How Asbestos Papers Are Made
1952
1954

SUBJECT: Paper Trade Journal made easier to read

Chances are you haven't noticed any changes in the pages of PAPER TRADE JOURNAL, because they have been made so gradually. But there *have* been improvements. We thought you'd like to compare a typical PTJ page as it looks today with a 1952 article of the same kind.

You can see what *we've done. Here's* why *we've done it.*

We have changed the set-up for one reason only—to make the magazine more readable, and therefore easier and faster for you to get ideas from the pictures and stories in our editorial pages. We have made three basic changes to improve readability:

1. The picture is larger in the 1954 example. This gives you more detail, more information, and gives it to you faster.

2. The headline has been moved *under* the picture. Experts tell us the eye goes to the picture first, and then scans it in a downward direction. Therefore, they say, the main title of the story should normally be displayed below the picture.

3. The text of the article is right next to the title, and begins with a bold, easy-to-read paragraph. You can tell at a glance what the article is all about, and whether or not you want to read it.

There are other changes all through the pages of PAPER TRADE JOURNAL, but this one example illustrates the kind of improvement we are constantly making. We have utilized the latest research on the subject of presentation of reading material and have engaged, on a continuing basis, one of the foremost authorities on this subject in the country.

The example illustrates, too, that PAPER TRADE JOURNAL spares no expense, omits no detail, in its effort to improve its quality for the benefit of you who read the magazine. Later messages in this space will report on some of the other improvements we are making continuously in the PAPER TRADE JOURNAL.

George E. Lockwood **PUBLISHER**

TRENDS

PAPER TRADE JOURNAL

Business Upturn Makes Headline News

To judge from the headlines, business shows evidence of a turn for the better. "Business shows some favorable signs of upturn," reads one economic report. "Business economists generally think decline is near the bottom" wrote *Wall Street Journal* under the head "Dip's Demise?" "Signs of Upturn Appear In Steel," ran the *New York Times* headline. And the chairman of the Council of Economic Advisers, Dr. Arthur F. Burns, "Is Hopeful That Contraction Has Run Its Course," according to a late *Journal of Commerce* report.

That business is talking upturn rather than recession in itself is held significant. It is noteworthy that the year as a whole now looks uncommonly good to more people.

Faith or Fact. Whether the improvement in business volume is more faith than fact, as suggested by one writer, it must be concluded that conditions have improved sufficiently to give a lift to national morale. But the sort of faith that will end a recession is that displayed by J. C. Penney Co. which reportedly will open 32 new stores this year to combat slumping sales. In addition, heavy expansion of existing units is planned.

New Construction Shows Unexpected Gains

To those who like Dr. Sumner H. Slichter, eminent economist of Harvard Business School, foresee an early business upturn, dollar expenditures for plant and equipment, construction and new housing starts are an essential element.

According to the Federal Reserve Bulletin, the value of new construction put into place, seasonally adjusted, rose to a new record level in March. Contracts awarded for new work increased substantially further, reflecting larger gains in private than in public constructions. The number of private housing units started rose to a high level during the month and, in the first quarter, was at a seasonally-adjusted annual rate of more than 1.1 million, close to the rate of a year earlier.

Building Boom for 1954. Commercial construction this year is due for a boost of at least 10 percent over last year's $2.2 billion peak, the Chamber of Commerce of the United States reports. Capital outlay for office buildings, loft buildings and warehouses, as a group, can be expected to total 15 percent greater than in 1953, while stores, restaurants, garages are forecast at least 5 percent more. Add to these main classes, hotels, motels, and commercial recreation buildings, and the 1954 total will reach $2.4 billion.

Spectacular features of the boom are lush expansion of office buildings and a great wave of shopping-center construction.

Faith In the Future Vs Shipments and New Orders

All this new construction is manifest faith in the future of the economy. Also it means boom-level business for building materials suppliers, household equipment, furnishings, etc., and steady employment for those industries.

The record of manufacturers shipments and new orders for March—the latest Office of Business Economics report—speaks for the down-to-earth facts.

Sales of all manufacturers aggregated $25.3 billion or $1.5 billion below last March. Compared with this February, however, March shipments of both durable and nondurable-goods producers were up 2 percent—seasonally adjusted.

While new orders rose above the total February rate, after seasonal adjustment, the gain was principally in transportation equipment.

Backlogs on manufacturers' books declined $1.2 billion, a lower rate than has been experienced in recent months. The decrease centered in durables; unfilled orders for non-durables were up fractionally.

Lighter Backlogs Father Sharper Competition

With some exceptions, the size of the unfilled-order backlog is the difference between stability and insecurity.

As it pertains to the paper and paperboard industry, long-term contracts on newsprint, book and publication papers, folding boxboards and special industrial packaging papers are excepted. Market wood pulp is a notable exception.

Anxiety to keep rolling means in too many instances the difference between selling *price* and merchandising at a profit. Further, it slows consumer buying to an immediate-needs trickle. Aggravated by cautious buying, the competition heightens, price weakness develops, and market stability is undermined.

Marginal Weakness In Set-up Boards Is Local

A pointed example of marginal weakness is found in non-bending boxboards in New York and other northeastern markets. It is not common to other areas.

Late reports show that local competition has again forced the price of plain chip, filled and solid news down to $70/75 levels, and has moved into the Boston area. Upstate prices are believed to be holding.

Reaction Noted In Wood Pulps, Waste Paper

In sum, the over-anxiety thus created sets up a chain which ultimately hits the raw materials markets. Wood pulp and waste paper markets are cases in point.

Wood Pulp Stability. Market wood pulp has been stable with but slight price changes during the last three quarters on an oversold domestic and international market.

Currently, mill cancellations of pulp reservations amount to approximately 5 percent—not a serious matter in view of oversold production and activity in export markets.

Neither is it seen as a developing trend in view of improving general business. The cancellations do serve to brake any producer ambitions for higher prices in the next quarter, however.

Waste Paper Slips Again. Price dips which began in the low grades of waste paper are now spreading to the higher grades.

In New York and Philadelphia, mixed paper and mill wrappers were cut $2 to $8 and $10, f.o.b. shipping point a week ago. Old corrugated also is off $2 and is quoted $13/14. *News* grades were cut $3 to $12 for No. 1, $15 for overissues.

News in the Boston market took a further cut to $12. Reductions in other low grades and in manila tab cards are reportedly under consideration.

Chicago market cuts are over a wider range: *mixed* and mill wrappers dropped $1, old corrugated $2; old brown kraft, $8; new double-lined kraft cuts, $5; kraft bag waste, printed, $10; white ledger, $5; book and magazines $2.50. On the other hand, No. 1 soft white shavings are up $5 to $65. (See Prices page 46.)

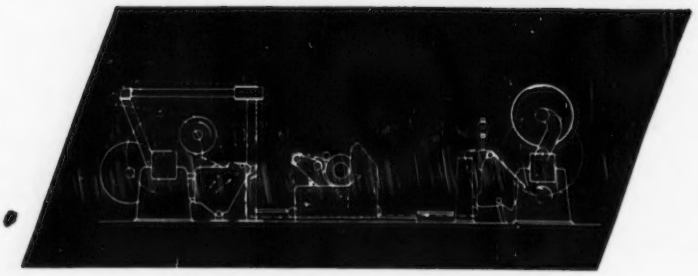
—E.P.N.

Paperboard Production (Tons)*

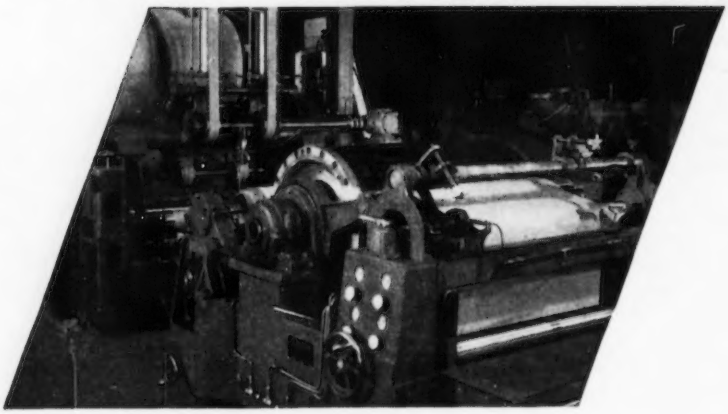
	Apr. 24 1954	Apr. 17 1954	Apr. 25 1953
Production	225,054	242,332	245,157
New Orders	199,437	209,612	184,365
Unfilled Orders	350,855	378,774	454,897
% of Activity	87	91	95

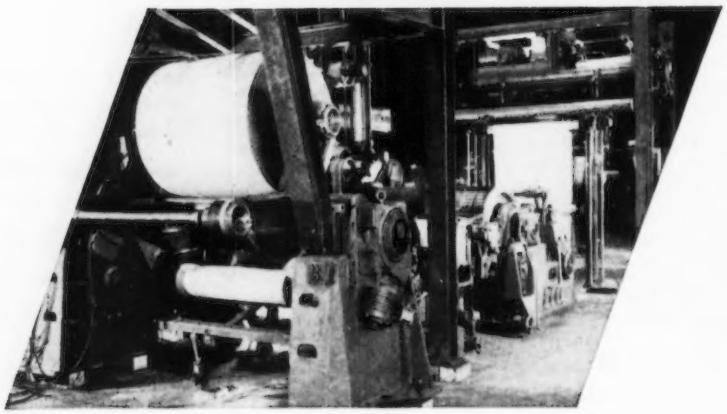
* Source: National Paperboard Assn.

You buy experience . . .



WITH DILTS POLYETHYLENE EXTRUSION LAMINATOR





You buy . . .

The experience of the leading converters who offered their ideas and data to provide the optimum operating features in the laminator.

The experience of the leading extruder manufacturer whose equipment Dilts includes to provide you with a complete package installation.

The experience of Dilts—designers of high speed converting machinery and experts in continuous unwinding and winding equipment which is so essential to successful production on Polyethylene laminators.

Model PL-1000 shown for operation to 1000 FPM; also available, Model PL-400 for operation to 400 FPM. Write for further details.

Dilts

THE BLACK CLAWSON COMPANY
DILTS MACHINE WORKS DIVISION
FULTON, NEW YORK

WEEK OF PAPER TRADE JOURNAL MAY 7, 1954

Galante Buys Warrensburg

Thomas A. Galante & Sons, Inc., has purchased the Warrensburg Pulp & Paper Corp., Warrensburg, N. Y.

At the same time, Thomas A. Galante, Chairman of the Board, reported that the new owners plan to develop the pulp producing facilities of this mill to coordinate with their expansion program at Mechanicville, N. Y. This development to culminate in the production of Ground Wood, Sulphite Pulp, Semi-Chem Fiber, etc.

Extensive improvements are also contemplated for the paper processing equipment, which include modernization of the 90" Yankee Fourdrinier for the production of Chem-fiber, Wrapping, Toweling, M. G. and Specialty Papers in different colors.

Mr. Galante also advised that all Purchases, Sales, Correspondence, and other matters pertaining to their Pulp and Paper Division, Warrensburg, N. Y., would be handled through their main office at Mechanicville, N. Y.

Isidor Baum was president of the Warrensburg Pulp & Paper Corp.

M. & O. Announces Another Project

Minnesota and Ontario Paper Co., has taken another step in the company's overall modernization and improvement program. The new project, to begin immediately, will involve extension of the present Insulite mill into the area now occupied by the company parking lot. The new building will be used for relocating coating and fabrication equipment and will provide space for some additional facilities and additional storage.

Marathon Buys Hoskin Property

The Marathon Corp., Menasha, Wis., has purchased the physical properties of the Hoskin Paper Co. at Menominee, Mich.

Marathon has been operating the former Hoskin plant under lease since April 1, 1944, making it the source of production for Waxtex, a household waxed paper now marketed through the firm's Northern Paper Mills at Green Bay.

Roy J. Sund, Marathon vice-president in charge of manufacturing, said no changes in operations were planned for the Menominee mill, which employs about 400 workers.

R. A. Hoskin, former president of the Hoskin firm, said the company has been dissolved and its assets distributed to its stockholders.

Argentina Controls Newsprint

Argentine newsprint production has been placed under Government control "in the national interest." The Ministry of Industry and Commerce will regulate quality, uniformity and grading, as well as the raw materials used. Under President Juan D. Peron's second five-year plan it is hoped to make Argentina self-sufficient in newsprint before 1957.

Canadian Keyes Fibre To Double Output

Canadian Keyes Fibre Co., of Hantsport, N. S., is launching an expansion program aimed at doubling its daily production of 400,000 units of molded paper plates and container products.

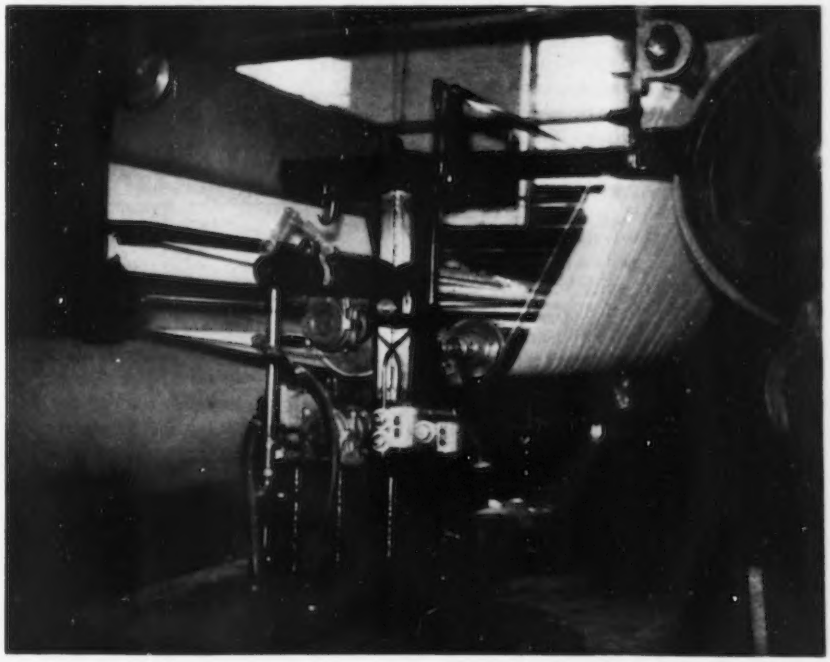
A subsidiary of Minas Basin Pulp & Power Co., the company uses groundwood pulp, pumped from the parent firm's mill and mixed with sulphite for some uses, turning out molded pie plates, table plates, food trays and cake circles.

Study Possibility Of New Alberta Mill

New York representatives of a well-known United States paper company journeyed to Edmonton, Alberta, recently to join Canadian associates in surveying plans for a $30 million pulp and paper mill near Edson, about 130 miles west of Edmonton.

Brazilian Bagasse Mill To Quadruple Output

Brazil's major mill producing paper from bagasse, at Monte Alegre, plans to boost its production 400 percent this year to a total of 50 tons a day.



NEW SIZE PRESS is part of an overhaul job now underway on the No. 2 paper machine at Franconia Paper Corp., Lincoln, N. H. All equipment for the size press, except the rolls, was fabricated in Franconia's machine shop. Involved in the installation was the moving of nine dryer rolls.

Size Press Installed on Hoquiam Machine

A program to improve the paper-making equipment at the Grays Harbor Div. of Rayonier Incorporated has been completed with the installation of a size press in the dryer section of the 202-inch fourdrinier.

The press was installed by Bagely & Sewall Co. during a seven-day shut-down of the machine. A three-tank starch preparation system was also installed, along with a new Mason-Neilan moisture control system on the dryers.

Resident manager George A. Holt stated that the mill has employed beater sizing for the last 25 years. He added that the completed program will permit manufacture of better qualities of paper at the mill and will broaden the line of paper products that can be made, giving the operation a better competitive position.

Madison Mill For Sale for 30 Years

An official of the Great Northern Paper Co. confirmed April 26 a report that its mill at Madison, Maine, is for sale, but he added that "this has been so for the past 30 or more years."

This official, who works in the Bangor office of Great Northern, also confirmed the report that there is a possibility that one of the two paper machines in the Madison plant might be shut down, saying, however, that if this occurred it would not necessarily mean the mill's labor force would be cut in two as was reported from one source.

He remarked that the machine is an old one and the possibility exists that the Madison mill might be run more efficiently without it. He intimated that if the machine were eliminated, the cut in employes could approximate one-third.

The Bangor man declared he knew nothing of the report that Hollingsworth and Whitney Co. has negotiated for the purchase of the Madison plant.

The elimination of the paper machine has not been definitely decided upon by the company.

Interstate Plans $75,000 Addition

The Interstate Folding Box Co., obtained a permit April 21 to build a $75,000 addition to its plant at Middletown, Ohio. The structure will be a two-story brick building and will add 7000 sq. ft. to the plant's floor space.

New Coated Paper Announced by Rhinelander

A new nitrocellulose coating for glassine papers was recently announced by Rhinelander Paper Co., Rhinelander, Wis. This new coating will be featured in Rhinelander's line of coated papers for food packaging and will be sold under the trade-name "Clarophane."

Perfection of this moistureproof coating climaxes five years of research and development in Rhinelander's own laboratories. It is claimed that the coating has twice the moisture-vaporproof qualities of most nitrocellulose lacquers now on the market. In addition, the manufacturer claims that its excellent heat-sealing qualities will guarantee top performance on automatic bag equipment. Glassine bearing the new coating has been field tested for over a year with very satisfactory results.

Expects Mead '54 Production To Equal That of '53

Shareholders of The Mead Corp. were told at the annual meeting by Sydney Ferguson, chairman of the board, that the demand for white papers continues at a high rate and Mead's production in 1954 is expected to equal 1953; that the corporation is well prepared to take care of increasing demands of board customers with the new tonnage which will be available when the Rome, Ga., mill begins operations this summer. Mr. Ferguson further stated: "Although the paper industry has been operating at a very high percent of capacity for the last several years and, while this ratio has stayed high in spite of large additions to capacity, we feel that new uses for paper together with the accelerating increase in population make for an ever growing field for our products. We look forward with confidence to increasingly profitable operations not only in 1954 but also in subsequent years."

Geo. H. Mead, S. C. Allyn, Walter H. J. Behm, Charles S. Cheston, J. H. Cunningham, Charles W. Deeds, Sydney Ferguson, Clarence Francis, E. T. Gardner, Alfred W. Jones, C. F. Kettering, Robert H. Lee, Al H. Mahrt, H. T. Mead, D. F. Morris, Murray Smith, C. R. Van de Carr, Jr., and H. E. Whitaker were elected directors.

At the directors' meeting, which followed immediately, the following officers were elected for the ensuing year: Geo. H. Mead, honorary chairman of the board; Sydney Ferguson, chairman of the board; H. E. Whitaker, president; D. F. Morris, first vice-president; Alan G. Goldsmith, Leonard R. Growdon, Herbert A. Kidd, Al H. Mahrt, H. T. Mead, A. J. Miller, Jr., George H. Pringle, R. H. Savage, Ford T. Shepherd, vice-presidents; George Robinson, treasurer; W. Walker Lewis, Jr., secretary; J. H. Cunningham, comptroller; Murray Smith, general counsel.

Paper and Board Production

According to the American Paper and Pulp Association, the ratio of United States paper production to mill capacity for the week ending April 24, 1954, was 1.5 percent, compared with 3.3 percent revised, for the preceding week. The ratio was 4.1 percent for the corresponding week a year ago. Mills producing newsprint exclusively are not included.

The paperboard production ratio for the week ending April 24, 1954, was 87 percent, compared with 91 percent for the preceding week, and 95 for the corresponding week last year.

(Detailed statistics on page 53).

Pulp & Paper Research In Canada

A brochure entitled "Pulp and Paper Research in Canada—A Survey of Current Work in Canadian Universities and Research Institutes" has been compiled by the Fundamental Research Committee of the Technical Section, Canadian Pulp and Paper Assn. This brochure contains a condensed summary of 80 research investigations, chiefly of a fundamental nature, on subjects of direct interest to the pulp and paper industry now being carried out at 11 Canadian Universities, the National Research Council, the Forest Products Laboratories, the Ontario Research Foundation and the Pulp and Paper Research Institute of Canada. The investigations deal largely with carbohydrate and wood chemistry, and a number of aspects of paper chemistry and physics, but do not include forestry.

Copies may be obtained free of charge by writing to the Technical Section, Canadian Pulp and Paper Assn., 3420 University Street, Montreal, Canada.

Correction

Our April 16 report of the formation of the Royal Fibre Corp., Santa Clara, Calif. implied that Royal Fibre was a division of Royal Container Co., San Francisco. Although the two concerns are closely allied, they are separate corporations and will operate as such.

PAPER PEOPLE

Glidden Heads Paper Operations at Personal Products

Robert D. Glidden has been appointed Director of Paper Operations of Personal Products Corp., and vice-president of Stonebridge Paper Corp. Mr. Glidden, who is also a member of the Board of Directors of Personal Products Corp. will be in charge of the company's paper mills at New Brunswick, N. J., Milltown, N. J. and the Stonebridge Paper Corp., Wilmington, Ill.

The Stonebridge Paper Corp. is a jointly owned property of Arthur Leonard, Jr., former vice-president of Lehon Co. and the Personal Products Corp. Mr. Leonard is president of the new concern.

Since October, 1953 this company has been operating a 90 inch Yankee Fourdrinier at the Lehon Co. while the new building to house it was under construction. The building is now completed and the machine is being moved to the new location where other mill and converting machinery is also being installed. The entire output of tissue and wadding as well as converted products will be purchased by Personal Products.

In addition to Mr. Leonard and Mr. Glidden, the officers are C. W. Stoeffler, treasurer and J. A. Gibson, secretary.

Trees for Tomorrow Reelects Entire Slate

All officers of Trees for Tomorrow, Inc., have been re-elected.

They include Folke Becker, Rhinelander Paper Co., Rhinelander, president; E. B. Hurst, Consolidated Water Power and Paper Co., Wisconsin Rapids, and C. G. McLaren, National Container Co., Tomahawk, vice-presidents; David B. Smith, Wausau Paper Mills, Brokaw, secretary-treasurer, and M. N. Taylor, Merrill, executive director.

Gaspesia Elects Wing and Robitaille

J. W. Wing, general manager and director of Gaspesia Sulphite Co., Ltd., was elected vice-president of the company and Paul Robitaille was named treasurer.

Mr. Wing succeeds W. J. Clarke of Quebec and Mr. Robitaille takes over the post of treasurer from G. H. Bridge of Quebec.

Mr. Clarke and Mr. Bridge are leaving the company because they have reached the retirement age of 65.

R. R. Edwards

R. R. Ferguson

C-Z of Canada Advances Edwards and Ferguson

R. R. Edwards has been named vice-president in charge of manufacturing and R. R. Ferguson has been assigned to the post of resident manager of the Ocean Falls Div. of Crown Zellerbach Canada Ltd.

Mr. Edwards joined the company in 1947 as assistant resident manager at Ocean Falls. In 1951 he was promoted to the position of resident manager and in 1952 made a vice-president of the company. Mr. Edwards' headquarters will now be in Vancouver. He will be responsible for all manufacturing operations of the company, including the Vancouver Converting Plant, Canadian Boxes Ltd. and also the Elk Falls mill at Duncan Bay.

Mr. Ferguson joined the company in 1934. He was appointed groundwood mill superintendent in 1947 and assistant resident manager in charge of pulp mills in 1951 and in 1953 was placed in charge of production.

Hamel Named Night Foreman

Wilfred U. Hamel, 318 Waldo St., Rumford, Maine, acid maker with the Island Division of the sulphite mill, Oxford Paper Co., has been promoted to night foreman of the sulphite mill. In his new post, he replaces William L. Whitehouse, deceased. Mr. Hamel joined Oxford in 1937 as a spare and in the same year became digester cook at the sulphite mill. In 1948, he was promoted to acid maker.

C-Z Promotes Flynn

Francis W. Flynn early in May will assume duties of assistant resident manager of the Port Townsend Division of Crown Zellerbach Corp.

The position has been vacant since April, 1952, when B. C. Smith, former assistant manager, was transferred to the resident manager's position at Lebanon, Ore.

Mr. Flynn entered the Camas division in 1934 as a technical employe and held various positions in the technical department until 1947, when he was transferred to the Camas kraft mill in a supervisory capacity.

His experience includes service as a professor in the Camas Paper School from 1941 through 1952, except for his time in the Navy. He was dean of the undergraduate school from 1952 to 1953 and at the present time is dean of the paper school.

Oxford Promotes Carney

Joseph R. Carney, production coordinator for the Oxford Paper Co. Rumford mill, will be promoted to staff assistant, manufacturing and transferred to the company's New York offices July 1.

Mr. Carney joined the Oxford Paper Co. as a trainee in Rumford in 1947.

Join Controllers Institute

Rudolph H. Blanker, treasurer, Esleeck Manufacturing Co., Turners Falls, Mass., and Eric S. Prior, controller and assistant treasurer, H. P. Smith Paper Co., Chicago, have been elected to membership in the Controllers Institute of America.

Heads Puget Sound's Board

Robert H. Evans, a Seattle attorney, has been elected chairman of the Puget Sound Pulp and Timber Co. He succeeds Fred G. Stevenot, who will continue on the board.

Allen Heads Sales Of Interstate Folding Box

T. Ronald Allen has been appointed vice-president in charge of sales of the Interstate Folding Box Co., Middletown, Ohio.

Mr. Allen will be responsible for the operation of a greatly expanded sales operation.

Interstate's entire international sales organization will meet in Middletown for a three-day session. During the meeting, representatives who sell the products of four Interstate divisions will hear Mr. Allen keynote the convention theme, "The New Look in Creative Selling."

Steve Smith Retires

Stephen W. Smith, associated with the New Haven Board and Carton Co., New Haven, Conn., as vice-president and general plant manager, has retired after 23 years of service with the company, in which he took an active part in its growth and development.

"Steve" Smith is well known throughout the board and carton industry. Before coming to New Haven he was affiliated with Bird and Sons, Walpole, Mass., for approximately 25 years.

Last October Mr. Smith was presented with a life membership in the American Pulp and Paper Mill Superintendants' Assn. — "In recognition of the many years of faithful and efficient service devoted to the paper industry and to the association."

Changes at Anglo-Canadian

Anglo-Canadian Pulp and Paper Mills, Ltd., has appointed the following:

W. E. Soles, a director and general manager of the company, was elected vice-president; C. H. Smith, previously assistant treasurer and chief accountant, is appointed treasurer; and W. G. D. Stanley is appointed assistant treasurer.

The retirement of W. J. Clarke, vice-president, and G. H. Bridge, F.C.I.S., treasurer, was also announced. Both Mr. Clarke and Mr. Bridge terminate a lengthy association with the company which they joined at the time of its organization.

W. E. Soles joined the company in 1935, was appointed mill manager in 1944 and is general manager since August 1952.

C. H. Smith has been with Anglo-Canadian since 1927 and was appointed chief accountant in 1938. He became assistant treasurer in April 1949.

Karl Dammann Advanced By Paterson Parchment

Paterson Parchment Paper Co., Bristol, Pa., has named Karl Dammann general plant superintendent. With Paterson for 36 years, Mr. Dammann previously was superintendent of maintenance. Over the years, Mr. Dammann has developed specialized equipment which aided in simplifying the process of producing Patapar Vegetable Parchment.

New V.P.s for National Container

Carlton F. Diskin and Samuel D. Bass have been elected vice-presidents of National Container Corp.

Mr. Diskin, a Baltimore attorney, was formerly assistant to the president. He joined National two years ago, prior to which time he was Assistant Chief Counsel of the Forest Products Division of O.P.S.

Mr. Bass, a New York attorney and C.P.A., was formerly comptroller of National Container, having joined the company seven years ago.

National also announced the election of Arnold Ginsberg as an Assistant Vice-President.

Mann Named Chairman of Executive Committee of National Container

Fredric R. Mann, of Philadelphia, chief executive and formerly principal stockholder of Seaboard Container Corp., has become chairman of the executive and finance committee of National Container Corp.

This was disclosed in the proxy statement sent to National's stockholders in conjunction with the call for the annual meeting, to be held this year at its mill in Jacksonville, Fla., on April 12.

Mr. Mann has also been nominated for election as a director. All present directors have been renominated. Following his election as director, according to the proxy statement, Mr. Mann will also be elected vice-chairman of the board of directors of National Container Corp.

Brush Resigns from Brown; Maling Succeeds Him

Howard G. Brush, vice-president and treasurer of Brown Co., has presented his resignation and Ernest H. Maling, a director of the company and former treasurer, has been elected in his place. Mr. Brush has been with Brown about six and one-half years and prior to that he was vice-president of Motor Products Co., Detroit, Mich. Mr. Brush's resignation was wholly voluntary. He has made his services available to the company as a consultant. Otherwise, all of the officers of the Brown Co. were re-elected at the meeting of the Board of Directors held in New York on April 26th.

Wright Heads Sales At New St. Regis Office

St. Regis Paper Co. has named Lewis E. Wright, formerly assistant sales manager at the Chicago office of the company's Kraft Division, as manager of the Division's new sales office at Cincinnati, Ohio.

The new office is located at 1720 Section Road, Room 104, in Cincinnati.

Summerlin Named Sales Manager of Westfield

John A. Summerlin has been appointed sales manager of the Westfield River Paper Co., Inc. The company, with plants in Russell and Lee, Mass., and West Conshohocken and Manayunk, Philadelphia, Pa., is one of the largest in its field, and manufactures a complete line of glassine and greaseproof papers used extensively for protective food packaging.

OBITUARIES

L. C. Anderson, 58, formerly manager of mills, The Ontario Paper Co., and lately Assistant to the President i/c Research and Development, died of a heart attack May 1 in a hospital in St. Catherines. He had been ill for sometime.

Hugo Ignatius, 67, general traffic manager of International Paper Co., died suddenly April 28 at the Black River House of International Paper Co., near Georgetown, S. C.

Mr. Ignatius was attending a conference of International Paper Co. officials at the time of his death.

John J. Maloney Sr., 84, associated with the Champion Paper Co. in Hamilton, Ohio prior to 1912, died April 20 at Excello, Ohio. From 1912 to 1920 he was president of the Franklin Coated Paper Co., which is now the Miami Valley Coated Paper Co.

BIRD SAVE-ALLS

are on the job wherever stock recovery is practised from the practical point of view of lowest cost per ton.

With a well planned Bird Save-All system, recovery efficiency is close to 100%. Stock matched for color, size or filler stays in the system until it comes out in the finished sheet. Start-ups are made without the waste and nuisance of handling large volumes of wet or dry broke. Washups are made in minimum time. Cost of installation, operation and maintenance is as low as it can be.

BIRD MACHINE COMPANY
SOUTH WALPOLE, MASSACHUSETTS

The Cram Disk Screen

A New Concept in Fine Screening Of Groundwood Pulp

R. A. Vogt and W. E. Spearin

Combined Locks Paper Co.,
Combined Locks, Wis.

About five years ago, our company decided to replace the fine screens in our groundwood mill. The screens then in use required considerable maintenance to keep in operating condition. Economically, when viewed either from obsolescence or depreciation standpoints, they were dead.

At about the time the replacement decision was made, H. G. Cram was developing a new screen at the mill. This screen represents a novel concept in the fine screening of pulps. It was selected to replace our old screens.

The purpose of this paper is to describe the new screen and to present the results obtained in its operation on groundwood pulp.

Screen Construction and Operation

The basic operating principles and construction of the Cram disk pulp screen, as this new unit is called, are covered in U. S. Patent 2,480,119 (issued August 30, 1949) and the Improvement Applications 70,648 of January 13, 1949 and 241,090 of August 9, 1951.

The screen consists essentially of a vertical, stationary, circular screen plate in combination with runners or paddles of selected design to sweep over its surfaces. These runners, mounted on a shaft perpendicular to the screen diameter and coincident with the center of the screen, do not contact the screen surfaces.

The screen receives the unscreened pulp near the center of the screen plate. The rotation of the runners sweeps it over the upstream plate surface. The movement is radially by centrifugal action and circularly by the direct action of the runners.

The runners produce a pulsating action. This action together with the pressure caused by the difference in head of stock between upstream and downstream sides of the plate, forces the acceptable fraction through the plate openings. The rejected fraction continues its travel over the upstream face to the rim of the plate. Here the coarse material is collected in an annular chamber for continuous and automatic discharge.

The accepted pulp on the downstream side of the screen plate discharges by gravity over a dam that maintains submergence of the screening surface. Dilution water, added at selected points of the screen plate surface, provides the desired consistency at the outer areas of the plate.

The runners rotate in a fashion similar to the impeller of a centrifugal pump. The screens, therefore, operate as low-head pumps, thereby allowing the primary and secondary screening steps to be on one floor level.

Figure 1 shows a general view—*Figure 2*, a diagrammatic outline—of the Cram groundwood screen system at Combined Locks Paper Co.

In this system, the grinder stock is pumped to a Jonsson vibrating screen. The screen plate perforations of this screen are ⅛-inch.

Accepted stock from the Jonsson screen flows by gravity to the inlets of the primary Cram screens. In turn, the accepted stock, from the primary screens, graded as catalog pulp, drops by gravity to a trough below the screens, while the primary rejects are elevated by the pumping action of the runners to an

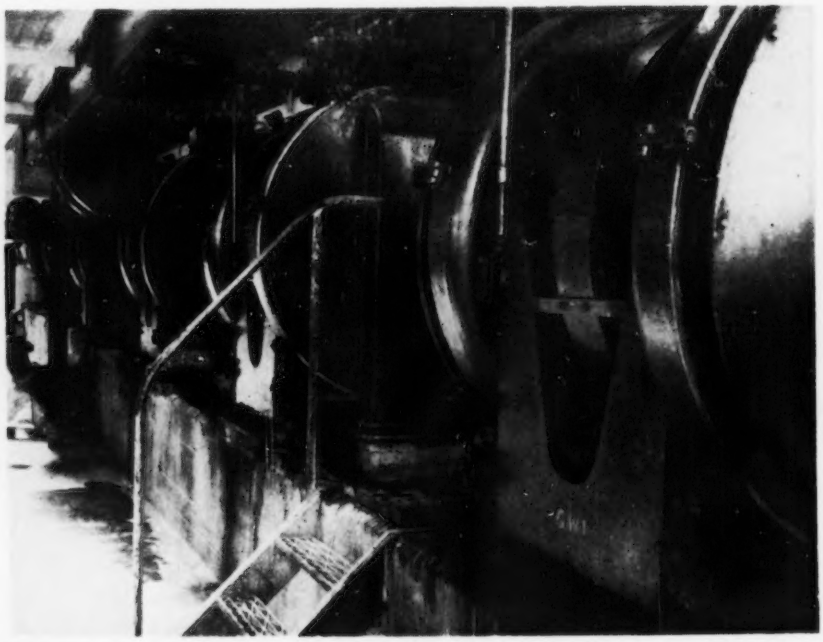


FIGURE 1 — GENERAL VIEW OF CRAM DISK SCREENS AT COMBINED LOCKS PAPER CO. The two nearest units are the primary groundwood screens. The third unit down the line (with the inlet leading from the overhead through) is the secondary groundwood screen. The Cram screens beyond these are used on another type of pulp.

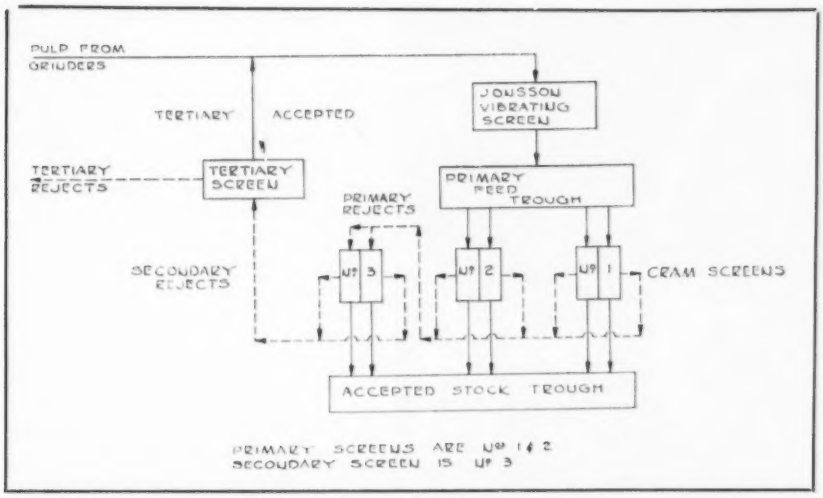


FIGURE 2—GROUNDWOOD SCREEN SYSTEM at Combined Locks Paper Co.

overhead feeding trough for the secondary Cram disk screen.

The accepted pulp from the secondary unit, also graded as catalog pulp, flows by gravity to the lower trough; while the secondary rejects are rescreened in a tertiary rotary screen. The accepted pulp from this rotary is returned to the Jonsson vibrating screen.

Plans have been made to send the secondary screen rejects to a refiner. The purpose of this change is to improve the operation of the overall groundwood system.

Figures 3, 4, and 5 show construction details of the Cram screen. These photographs, taken during assembly work on a unit, show the two separate screens of the unit. Each screen is independently operable. The runner drive, however, is common for the two screening chambers.

The outside casing of one screen chamber has been removed *(Figure 4)* to show the downstream runner assembly and the grid that supports the screen plate—while the grid with its screen plate has been removed *(Figure 5)* to show the upstream runner assembly and the pulp inlet ports.

The annular chamber for rejects is formed by the rim of the screen grid and the casing walls. The rejects are removed at the top of the screen housing. Their flow rate is controlled both by white water dilution at the rejects outlet and by the width of the annular slot through which they must pass at the periphery of the screen plate.

Permanent fresh water connections at the base of the outer housing permit rapid and thorough washing of the interior of the unit.

The screen base and inner screen housings are both made of cast iron; the outer housing, of welded steel construction; and the screen grid and runner hubs, of cast brass. Shaft and runners are stainless steel.

A 20-h.p. motor drives the double screen through a V-belt and pulley system.

Each primary screen is fitted with 0.050-inch perforate plates. The runners rotate at 195 r.p.m. The screen plate area is four feet in diameter. The plate is dished at an angle of nine degrees—45 min. to the vertical.

Two upstream runners and four downstream runners, each having a cross-sectional design as shown in *Figure 6*, have proved to be most suitable for our operation.

The secondary screen is of the same design as the primaries except that it uses a 0.040-inch perforate plate.

The floor space requirement of the complete dual screen, including motor and disassembly area is 92 in. by 114 in., or about 73 sq. ft. The height of the screen, with overhead trolley and rail for disassembly, is 75 in.

The Cram disk screen has several operating advantages over previous types of standard screens. At shutdowns, it can be washed free of fiber quickly and thoroughly without disassembly or other preparation. Also, all internal areas of the screen are in direct contact with the moving pulp suspension. Thus, during normal operation, they are being continually flushed clean of slime or other deposits. In addition, the screen can be disassembled, refitted with screen plates and reassembled by two men in about twenty minutes.

Low maintenance and operating costs have been apparent ever since our screens were installed.

Performance Data

The Cram screens have performed satisfactorily since the initial development work was completed and the permanent installation made. Both the primary and secondary screening operations have ben tested thoroughly. Two following data will illustrate test results.

Primary Screening

All of the primary screen data to be presented were obtained on our No. 1 Cram screen. Plates with 0.050-inch and 0.040-inch perforations were used during the testing. Two upstream and four

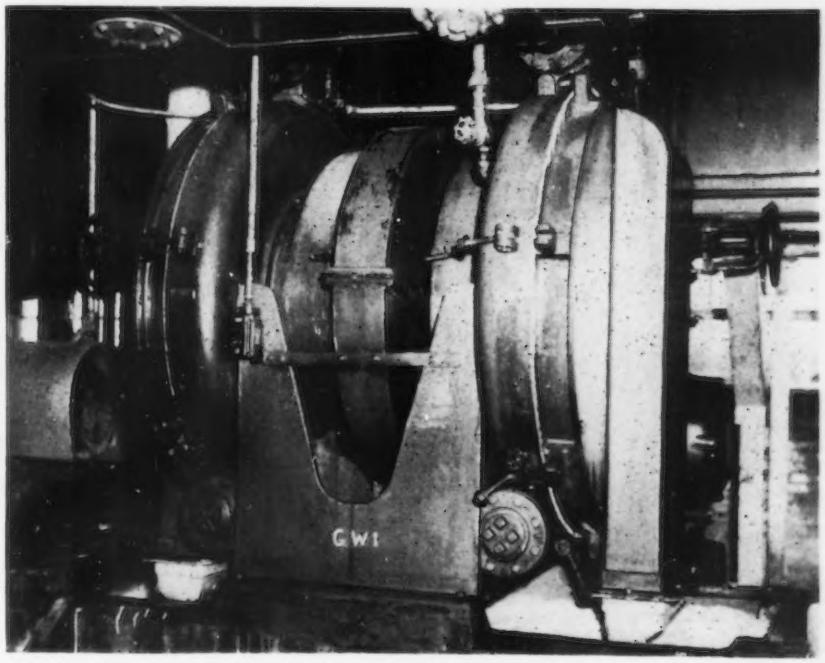


FIGURE 3—THE CRAM DISK SCREEN—OUTSIDE VIEW. This view shows the right-hand outside casing ready for removal. Note that the bolts have been thrown back and that the outside casing has been fastened to a trolley, the top of which is out of view.

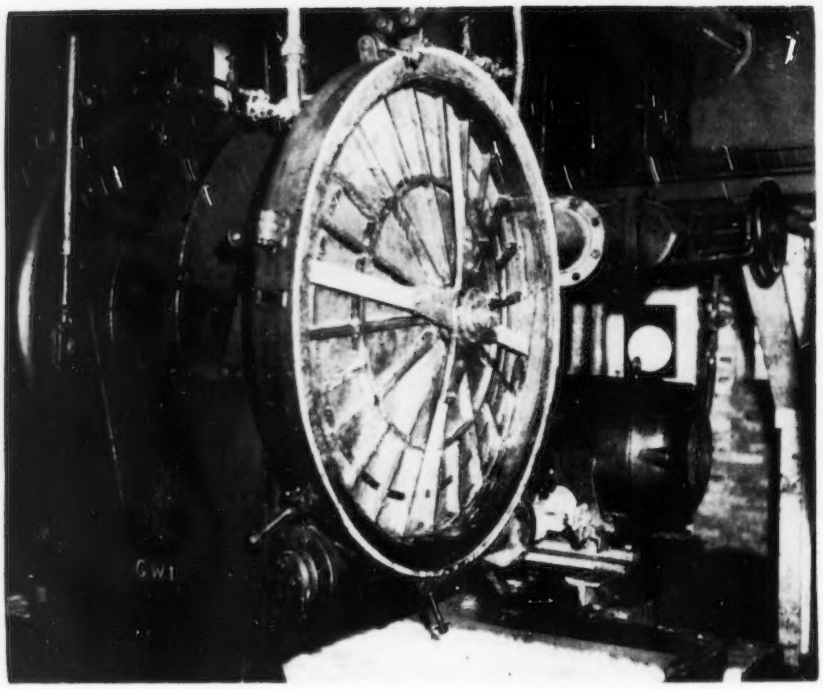


FIGURE 4—THE CRAM DISK SCREEN—WITH HOUSING REMOVED. The four downstream runners and the screen plate with its supporting grid are shown here. The outside casing has been removed from view.

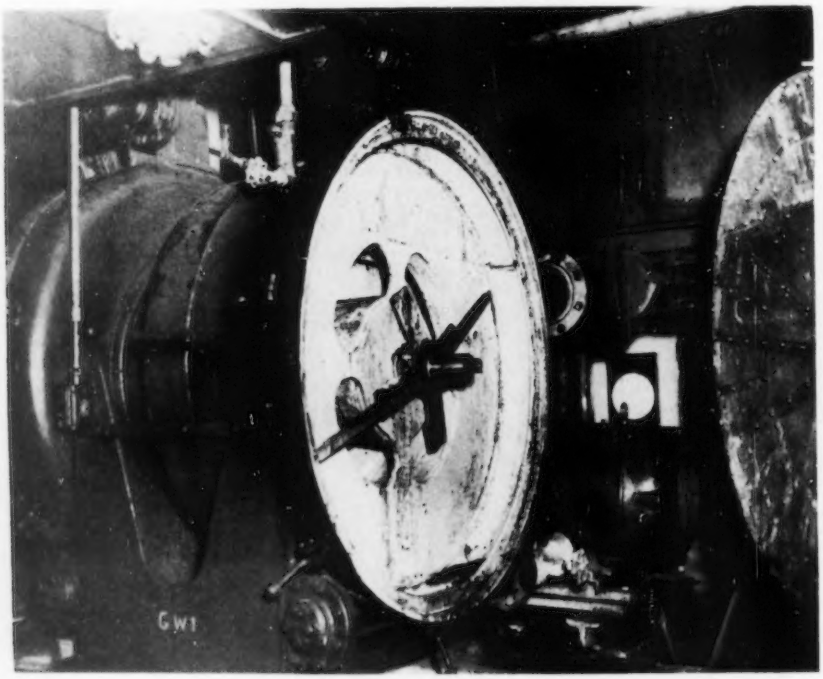


FIGURE 5—THE CRAM DISK SCREEN—INNER VIEW. Here are shown the upstream runners, the pulp inlet ports, and the peripheral ring that controls the flow of screen rejects. The downstream runners have been removed, and the screen plate as mounted on its grid has been moved to the extreme right, where the upstream surface of the screen can be seen. Also visible at the extreme top center is the discharge for the screen rejects.

downstream runners provided the agitation. The runner design was as shown in *Figure 6*. Rotational speed was 195 r.p.m. except for trials to show effect of speed variation. No. 1 East and No. 1 West screens (the two screening units of No. 1 screen) were identical in internal construction. Both screen units were equipped with annual rings at the upstream sides of the screen plates to provide rejects slots about ¼-inch wide. Standard 8-inch pipe connected No. 1 East screen to the bottom of the feed trough; while a rectangular pipe connected the No. 1 West screen to the side of the supply trough.

The pulp stock was a groundwood mixture composed normally of 70 percent spruce and 30 percent poplar.

Methods of Evaluation

The important action of any pulp screen is to remove oversize pieces of wood (shives) from the smaller fibers and fiber bundles. The following tests were taken as being indicative of screening action:

1. Shive Counts. Shive counts were made on the pulp received and on the pulp accepted by the screen. The screen efficiency (E_s) based on shive count per gram of pulp was taken as

$$E_s = \frac{S_F - \frac{S_A \times A}{100}}{S_F} \times 100$$

where S_F = shive count per gram of pulp feed,
S_A = shive count per gram of accepted pulp, and
A = ratio of accepted pulp to feed expressed in percentage, and computed as described below.

The shive counts were determined on six hand sheets per sample. The counts were made by viewing the sheets with the aid of transmitted light from a 100-watt incandescent bulb. The bulb was placed about six inches in back of the sheets. The sheets were inspected at a 90-degree angle with the eye about twelve inches away.

The handsheets were 6" square. They weighed approximately 0.9 gram each.

The shive counts per gram were averaged over the six sheets. In addition, total speck counts (shives, bark, and dirt) were made during some of the tests.

2. Fiber Classification. A Bauer-McNett fiber classifier was used to determine relative fiber fractions in the input, accepted, and rejected pulps. The fiber retained by the 20-mesh screen was considered as potential tailings or rejects—the fiber passing the 20-mesh screen, acceptable or good pulp. The screening characteristics were computed as follows:

Screen Efficiency (E_T) Based on Tailings:

$$E_T = \frac{(T_R)\ (T_F - T_A)}{(T_F)\ (T_R - T_A)} \times 100$$

where T_F = % of tailings in feed stock
T_A = % of tailings in accepted stock
T_R = % of tailings in rejects from screen

Loss of Good Stock in Rejects (L):

$$L = \frac{(T_F - T_A)\ (100 - T_R)}{(T_R - T_A)\ (100 - T_F)} \times 100$$

Ratio of Accepted Pulp to Feed Pulp (A):

$$A = \frac{T_R - T_F}{T_R - T_A}$$

Evaluation of Screening Action

Some data are given in *Table A* that might be representative of classification tests and shive counts obtained around a pulp screen. Referring to Condition A in *Table A*, the screen efficiency, E_T, would be

$$E_T = \frac{13.1}{8.7} \times \frac{8.7 - 5.3}{13.1 - 5.3} \times 100 = 65.6\%$$

This calculation shows that 65.6 percent of the tailings present in the feed is rejected by the screen. Thus, if 100 pounds of tailings came in to the screen with the feed, 65.6 pounds would be rejected —the remainder would pass out with the accepted pulp.

Computation of the amount of good stock lost with the screen rejects reveals the following:

$$L = \frac{8.7 - 5.3}{13.1 - 5.3} \times \frac{100 - 13.1}{100 - 8.7} \times 100 = 41.5\%$$

In other words, for every 100 pounds of *good* pulp entering the screen, 41.5 pounds leave the screen with the rejects and 58.5 pounds pass out of the screen as accepted pulp.

The accepted stock produced by the screen may be computed as follows:

$$A = \frac{13.1 - 8.7}{13.1 - 5.3} \times 100 = 56.4\%$$

Thus for every 100 pounds of dry pulp entering the screen, 56.4 pounds are taken off as accepted pulp and 43.6 pounds are rejected.

The screen efficiency based on shive count would be:

$$E_S = \frac{120 - (50 \times 0.564)}{120} \times 100 = 76.5\%$$

For every 100 shives entering the screen, 76 shives are rejected—24 shives remain with the accepted pulp.

The corresponding values for Conditions B and C can be computed in a similar manner. These values are summarized in *Table B*.

To obtain a single-value description of the operation of the screen, $E_S \times A$ (overall efficiency) has been computed. Thus, if the screen efficiency, E_S, is high and the value of A is low, the screen probably would not be functioning satisfactorily. Such efficiency would be indicated by the small number obtained as the product of E_S and A. Moreover, a high value for A and a low figure for E_S would give the same result. The absolute value of $E_S \times A$ is practically without meaning, but its use as a relative number has been found to be of some importance in the interpretation of screening action.

It is quite clear that Condition C *(Table II)*, with its overall efficiency of 56.5 percent, is superior to the other Conditions—the loss of good stock is the lowest. On the other hand, if exceptionally clean stock is desired from the screen, without regard to production rate and power consumer, Condition A would be chosen because of its high values of E_T and E_S. Such conclusions are not immediately apparent from the basic data given in *Table A*.

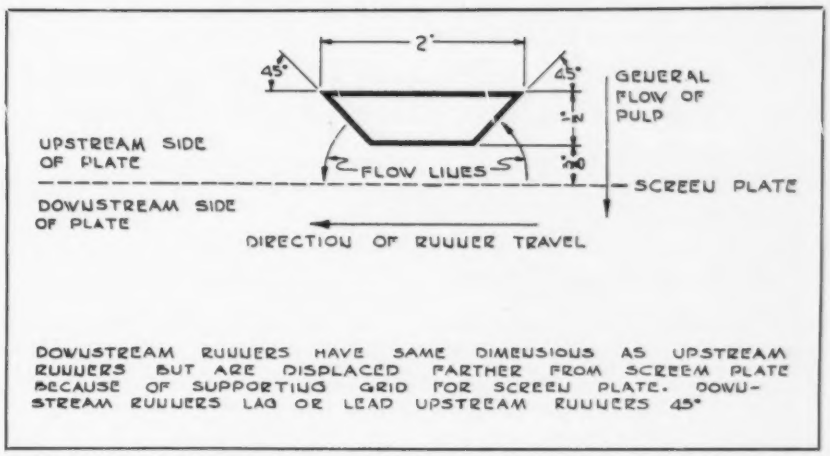

2"
45°
45°
GENERAL FLOW OF PULP
UPSTREAM SIDE OF PLATE
FLOW LINES
SCREEN PLATE
DOWNSTREAM SIDE OF PLATE
DIRECTION OF RUNNER TRAVEL
DOWNSTREAM RUNNERS HAVE SAME DIMENSIONS AS UPSTREAM RUNNERS BUT ARE DISPLACED FARTHER FROM SCREEN PLATE BECAUSE OF SUPPORTING GRID FOR SCREEN PLATE. DOWNSTREAM RUNNERS LAG OR LEAD UPSTREAM RUNNERS 45°

FIGURE 6—CROSS-SECTIONAL DESIGN OF RUNNERS used in Cram Disk Screen.

TABLE A. FIBER FRACTION AND SHIVE COUNT DATA

	Fiber Fraction (On 20-Mesh) %			Shives per Gram	
Condition	Feed	Accepted	Rejects	Feed	Accepted
A	8.7	5.3	13.1	120	50
B	8.7	5.3	21.4	120	50
C	6.7	5.3	21.4	120	50

TABLE B SCREENING CHARACTERISTICS CALCULATED FROM DATA OF TABLE A

Condition	E_T	E_S	A	$E_S \times A$	L
A	65.6	76.5	56.4	43.1	41.5
B	52.0	67.2	78.8	53.0	18.2
C	27.8	61.9	91.3	56.5	7.3

TABLE I. SHIVE, BARK, AND DIRT COUNTS ON GROUNDWOOD PULP DURING PRIMARY SCREENING

Cram Disk Screen with 0.050-Inch Perforate Plates

	Shives per Gram		Bark per Gram		Dirt per Gram	
Sample Group	Feed	Accepted	Feed	Accepted	Feed	Accepted
1	85	35	60	60	39	43
2	68	28	40	46	41	41
3	116	47	61	56	45	46
4	121	46	66	60	43	38
5	145	61	74	82	46	52
6	183	77	68	68	42	38

Primary Screen Data

Bark and Dirt Removal

Counts were made for bark and dirt on a considerable number of samples at No. 1 East Cram screen. The purpose of these tests was to show that a screen can only be effective in removing shives. *Table I* shows these counts as well as the shive counts from corresponding samples. In every case, the screening reduced the number of shives, but the bark and dirt counts remained essentially the same as before screening. This

evidence emphasizes the importance of thorough wood cleaning and good housekeeping.

Effect of Shive Load in Feed Stock

The question often arises whether screen efficiency falls off as shive count of feed increases. This question was answered by the test results tabulated in *Table II*. According to these data, E_s is approximately the same at both high and low initial shive count. In other words, the same percentage of shives is rejected regardless of the number of shives entering the screen. Therefore, assuming other conditions constant, the quality of the pulp entering the screen determines the shive content of the accepted pulp.

Effct of Consistency

Table III summarizes some of the information gathered during screening in the low-consistency range. All of these data pertain to No. 1 East Cram screen. It would appear from them that, based on shive count, lower consistencies favor higher overall screen efficiencies. Furthermore, the percentage of accepted stock increases with decreasing consistency. On the other hand, feed rate (dry basis) would presumably decrease with decreasing consistency, because the screen has a limited hydraulic capacity.

The rate of feed of dilution water was constant throughout these tests. This dilution rate has a decided effect on result obtained.

TABLE II. EFFECT OF INITIAL SHIVE COUNT ON CRAM SCREEN OPERATION

Primary Screen with 0.050-Inch Perforate Plates

Sample Group	Shive Count on Feed, Shives per Gram	Er	Es	A	Es x A	L
1A	325	46.1	71.1	82.5	58.7	15.3
1B	121	43.6	69.5	81.0	56.3	16.7
2A	248	55.8	72.8	78.7	57.3	18.4
2B	116	52.1	68.4	77.8	53.2	19.0

TABLE III. EFFECT OF CONSISTENCY ON CRAM SCREEN OPERATION

Sample Group	Consistency of Feed, % O.D.	Er	Es	A	Es x A	L
	0.040-Inch Perforate Plate					
1	0.7	78.4	87.3	63.9	55.8	33.0
2	.63	60.0	86.2	70.0	60.4	27.5
3	.40	71.0	93.0	73.2	68.0	23.1
	0.050-Inch Perforate Plate					
4	0.61	46.9	66.5	84.3	56.0	13.2
5	.43	25.8	62.9	89.8	56.4	8.7

TABLE IV. EFFECT OF SCREEN DILUTION RATIO ON CRAM SCREEN OPERATION

Primary Screen with 0.050-Inch Perforate Plates

Sample Group	Screen Dilution Ratio, W	Consistency of Feed, % O.D.	Er	Es	A	Es x A	L
1	1080	0.73	43.6	69.5	81.0	56.3	16.7
2	900	.73	55.8	72.8	78.7	57.3	18.4
3	540	.74	64.5	76.7	56.4	43.2	41.5

Note: W is the pounds of dilution water added at the screen per 100 pounds of dry stock fed.

TABLE V. EFFECT OF RUNNER SPEED ON CRAM SCREEN OPERATION

Primary Screen with 0.050-Inch Perforate Plates

Group	Runner Rotational Speed, RPM	Consistency of Feed, % O.D.	Er	Es	A	Es x A	L
1A	250	0.72	32.4	51.0	90.0	45.9	8.4
1B	195	.69	40.8	68.0	85.0	57.9	13.4
2A	250	.53	27.4	39.8	90.1	35.9	8.6
2B	195	.59	54.5	77.0	78.9	60.7	18.3

Screen Efficiency and Dilution at the Screen

The amount of dilution at the screen was computed from the consistency values of the stock entering and leaving the unit. Thus, the pounds of water (W) added for every 100 pounds of stock (dry basis) entering the screen is

$$W = \frac{A}{a} - \frac{100 \;\&\; A}{r} - \frac{100}{f}$$ {assuming negligible solids in the white water}

where A = pounds (dry) of accepted stock per 100 pounds of feed.
a = consistency of accepted stock
r = consistency of rejected stock
f = consistency of feed.

Table IV shows some comparable data for several values of W. The effect of consistency on screening is apparent. As the dilution ratio, W, decreased (higher consistency in the screen), the screen efficiencies, E_s and E_T, increased. Similarly, there was an increase in loss of good stock with the rejects. Pulp consistencies used during primary screen operation, therefore, depend to some extent on the type of accepted pulp desired.

Effect of Runner Speed

The rotational runner speed was raised from 195 rpm. to 250 rpm. by a change in the drive pulley. This increase was effected in order to determine if it would increase screen production without decreasing pulp quality.

The results obtained for the higher speed are shown in Table V. They reveal that the higher runner speed produced more accepted pulp per 100 pounds of stock feed. It also lowered the loss of good stock in the rejects. However, the quality of the accepted pulp suffered markedly.

TABLE VI. PRIMARY SCREEN OPERATING DATA IN FOUR GROUNDWOOD PULP MILLS

Sample Source	Perforation Size, in.	Consistency, % O.D. Feed	Accepted	Rejects	Canadian Std. Freenss of Accepted Pulp, ml.	Er	Es	A	Es x A	L
A	0.065	0.52	0.47	1.64	165	68.3	56.0	75.0	42.0	18.9
B	0.050	.76	.61	.097	40	41.7	75.0	87.0	65.3	9.8
C	0.038 to 0.042	.61	.56	.96	30	48.4	74.4	82.5	61.4	14.7
D	0.045	.61	.42	.54	41	14.9	8.62	97.5	84.0	1.8

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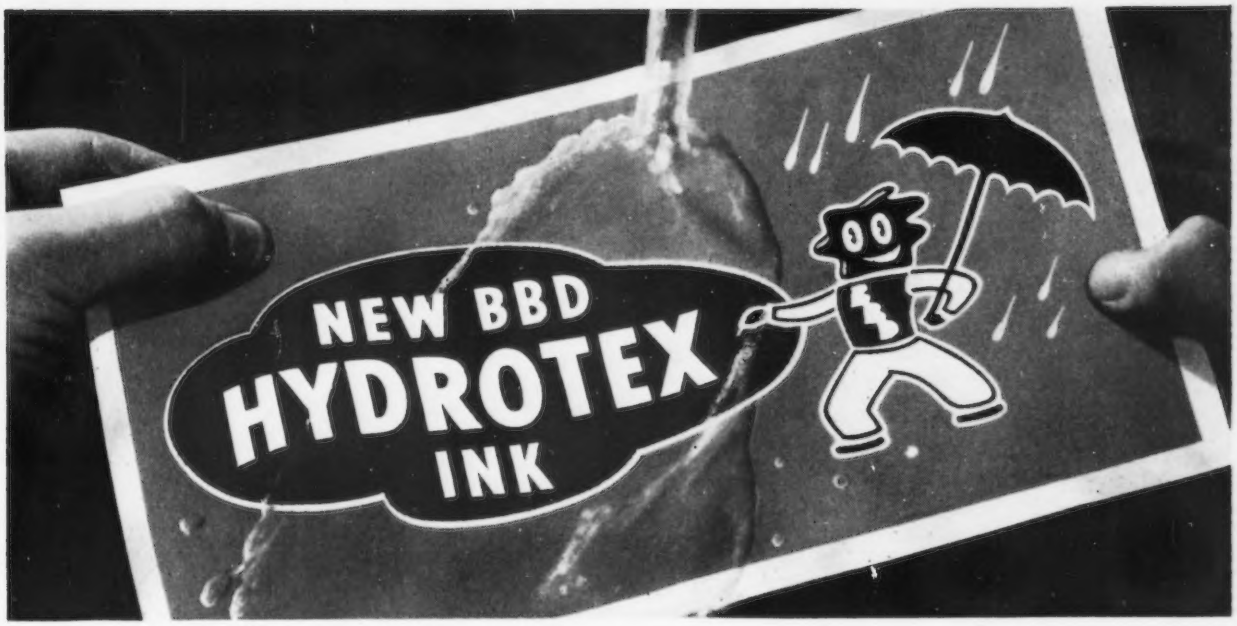

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TABLE VII. GRAM PRIMARY SCREEN OPERATING DATA

Screen Perforation Size, in.	Feed	Consistency, % O.D. Accepted	Rejects	Canadian Std. Freeness of Accepted Pulp, ml.	Er	Es	A	Es x A	L
0.050	0.61	0.56	0.88	26	46.9	66.5	84.3	56.0	13.2
0.040	.63	.52	.65	37	60.0	86.2	70.0	60.4	27.5
0.040	.40	.33	.65	37	71.0	93.0	73.2	68.0	23.1

Other Primary Screens Compared

The experimental work on the Cram disk screen created the desire to obtain comparative data for other types of groundwood pulp screens in order to evaluate relative merits with regard to screened pulp quality. No indication of relative production capacities, power requirements, or maintenance cost, however, can be obtained by such comparisons. A fine comparison of the several screens would be possible only by actual operation of the several units in the same groundwood system.

Four mills supplied samples of groundwood pulp. The samples from each mill included pulp before the primary screen, accepted pulp from the screen, and rejects from the screen. Insofar as possible, the samples represented normal mill operation.

Table VI lists the pulp sources only by code. It does not identify the types of screens involved. Test data covering the four sets of samples are tabulated.

Similar data relating to the Cram disk screen are shown in Table VII. These data show as high a shive reduction for the Cram disk screen as for any of the other screens investigated. They also show that the overall efficiency ($E_s \times A$) of the Cram screen is equally as good as that of most of the other screens.

Test data for Source D pulp *(Table VI)* are unusual. They indicate that either a great portion of the long-fibered pulp was removed before primary screening or the grinding operation in the mill produces a pulp containing only a small amount of long-fibered material.

Cram Screen as Primary Unit

These data were augmented with considerable other information obtained through study of runner design, direction or runner rotation, pulp freeness, static head of the inlet stock, screen-plate perforation size, use of Heresite coated screen plates, screen inlet style, power consumption, and production rate. The combined data show that the Cram disk screen can produce a good quality of groundwood when operated as a primary unit. With all factors considered, the screen, as well as the auxiliary equipment, has ben chosen to produce the optimum operating characteristics as guided by ultimate screened pulp requirements.

Data obtained early in this study showed that the No. 1 East Cram screen produced screened pulp of better quality than the West unit. *Table VIII* shows this difference in stock quality.

The East screen gave far better shive reduction than the West screen. There was little difference in ratio of accepted pulp to pulp feed (A).

The only apparent difference in the two screens was the inlets. The East side was fitted with an inlet from the bottom of the feed trough. The West side had the inlet originating at the side of the trough.

The basic cause for the difference in screening action is a matter of speculation. Subsequent replacement of the original West side inlet with an inlet similar to that on the East screen eliminated the difference in screened pulp quality.

Each Cram primary double screen will produce approximately 45 tons of screened groundwood pulp per 24 hours. Power consumption at this rate is about 19 hp. In other words, energy consumption is less than 0.45 h.p.—days per ton of screened pulp.

TABLE VIII. EFFECT OF CRAM SCREEN INLET DESIGN ON ACCEPTED PULP QUALITY

Primary Screen with 0.050-Inch Perforate Plates

Sample Group	Screen Side	Er	Es	A	Es x A	Shive Differential, %
2A	East	48.9	67.3	78.3	52.7	58.2
2B	West	42.3	44.8	81.0	36.1	31.8
4A	East	...	...	...	...	62.8
4B	West	...	...	...	...	20.9
3A	East	...	...	...	...	57.9
3B	West	...	...	...	...	34.7

Note: Shive Differential refers to the reduction in shive count across the screen (based on the shive count of the entering stock).

Thus:

$$\text{Shive Differential} = \frac{S_F - S_A}{S_F} \times 100$$

Where S_F = shive count per gram of pulp feed

S_A = shive count per gram of accepted pulp

TABLE IX. EFFECT OF PULP FEED CONSISTENCY ON CRAM SECONDARY SCREEN PERFORMANCE

0.040-Inch Perforate Plates

Sample Group	Consistency of Feed, % O.D.	Er	A	Er x A	L
2	0.72	86.0	46.8	40.3	47.7
2	.59	84.2	50.0	42.1	43.2
3	.47	76.6	61.5	47.1	32.3
4	.39	76.6	64.7	49.5	26.4
5	.30	81.6	55.9	46.6	33.4

Secondary Screening

Test data on the Cram disk screen, similar to those data obtained for primary screening, were also obtained for secondary screening. Illustrative of the results of these tests are the data in *Table IX* and *Figure 7*. Both the data

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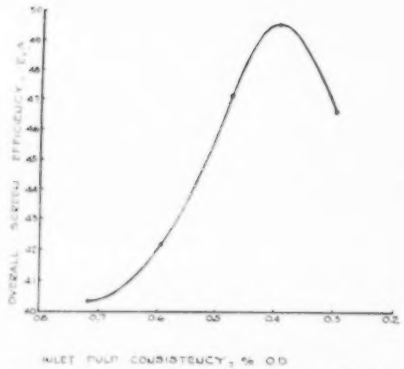


FIGURE 7—THE RELATION OF INLET PULP CONSISTENCY to overall efficiency of the Cram secondary screen on groundwood pulp.

and the graph show the effect of pulp feed consistency on secondary screen operation. Apparently, optimum secondary screen operation is attained when the stock consistency at the inlet is about 0.4 percent (other screen conditions as previously described). Repeated shive counts on the primary and secondary screened pulps show that the Cram secondary unit with 0.040-inch perforate plates produces no higher shive content than the primary units, with 0.050-inch perforate plates.

Presented at the Fall Meeting of the Northwestern Div., American Pulp and Paper Mill Superintendents Assn., Hotel Wausau, Wausau, Wis.

NEW LITERATURE

Worthington Geared Turbine Generators. (Bulletin 1969) Describes engineering and construction features, including two types of governing arrangements, hand and automatic nozzle control; also other controls and accessories. Worthington Corp., Harrison, N. J.

Westinghouse Transductor Magnetic Amplifiers. (Booklet TD 52-601) Provides technical data on current and potential transductor magnetic amplifiers; definitions of magnetic amplifier terms; application specifications to establish terminology for operating characteristics. Also suggests applications for transductor Magamps in excitation systems, electrical transportation systems and where isolation is important. Westinghouse Electric Corp. P. O. Box 2099, Pittsburgh 30, Pa.

Permanite Pipe and Fume Ducts — Equipment. (Bulletins 1 and 6) Includes physical properties, dimensions and engineering drawings of connections and fittings. Bulletin 6 covers Towers, Distributors, Sinks and Trays, Jars and Tanks, as well as physical properties and list of uses. Maurice A. Knight Co., Kelly Avenue, Akron 9, Ohio.

P-A-X Code Call Service. (Brochure) Describes how executives and key employees can be quickly reached any place in the plant or office by a special signaling device that is part of an internal business telephone system. Automatic Electric Co., 1033 W. Van Buren Street, Chicago 7, Ill.

Pulp and Paper Research in Canada—A Survey of Current Work in Canadian Universities and Research Institutes. (Brochure) Contains condensed summary of 80 research investigations, chiefly of a fundamental nature, on subjects of direct interest to the pulp and paper industry. Deals largely with carbohydrate and wood chemistry, a number of aspects of paper chemistry and physics, but does not include forestry. Compiled by Fundamental Research Committee of the Technical Section, and available free from Technical Section, Canadian Pulp and Paper Assn., 3420 University Street, Montreal, Canada.

The Story of Starches. (56p Semi-Technical Booklet) Painted in broad strokes this booklet gives a panoramic picture of starches—their properties, production, applications and handling, for use not only by chemists and technically trained personnel in the paper industry, but also by non-technical readers. Also contains numerous charts on the effect of temperature, agitation, cooking time, and pH on gelatinization and breakdown of corn starch, as well as starch conversions and moisture content vs relative humidity. The Glossary contains definitions of the more unusual technical trade names. National Starch Products, 270 Madison Avenue, New York 16, N. Y.

American 750 Crane . Shovel . Backhoe . Dragline. (Catalogue 700-G-24) Provides action pictures of new 1½ yard shovel, 35-ton crane in quarries, gravel plants and handling pulpwood; also description of many exclusive features for saving time and money. American Hoist & Derrick Co., 63 S. Robert street, St. Paul 1, Minn.

Accr-o-meter With Brown Electronik Recorder. (Instrumentation Data Sheet 10.0-16) Describes Scott Testers' accr-o-meter tensile tester which, in conjunction with a Brown Electronik recorder, provides a continuously recorded stress-strain curve for laboratory or production control tensile strength or stretch analysis. Minneapolis-Honeywell Regulator Co., Wayne & Windrim Avenues, Philadelphia 44, Pa.

Allegheny Metal in Chemical Processing. (Revised 34p. Book) Covers use of stainless steel in manufacture of acids and other chemicals, general process industries, plastics industry, etc. in table on consumption of chemicals 1942 and 1952, paper is in second place. Also included are corrosion resistance data, fabricating information, and a stainless steel finder. Allegheny Ludlum Steel Corp., 2020 Oliver Bldg., Pittsburgh 19, Pa.

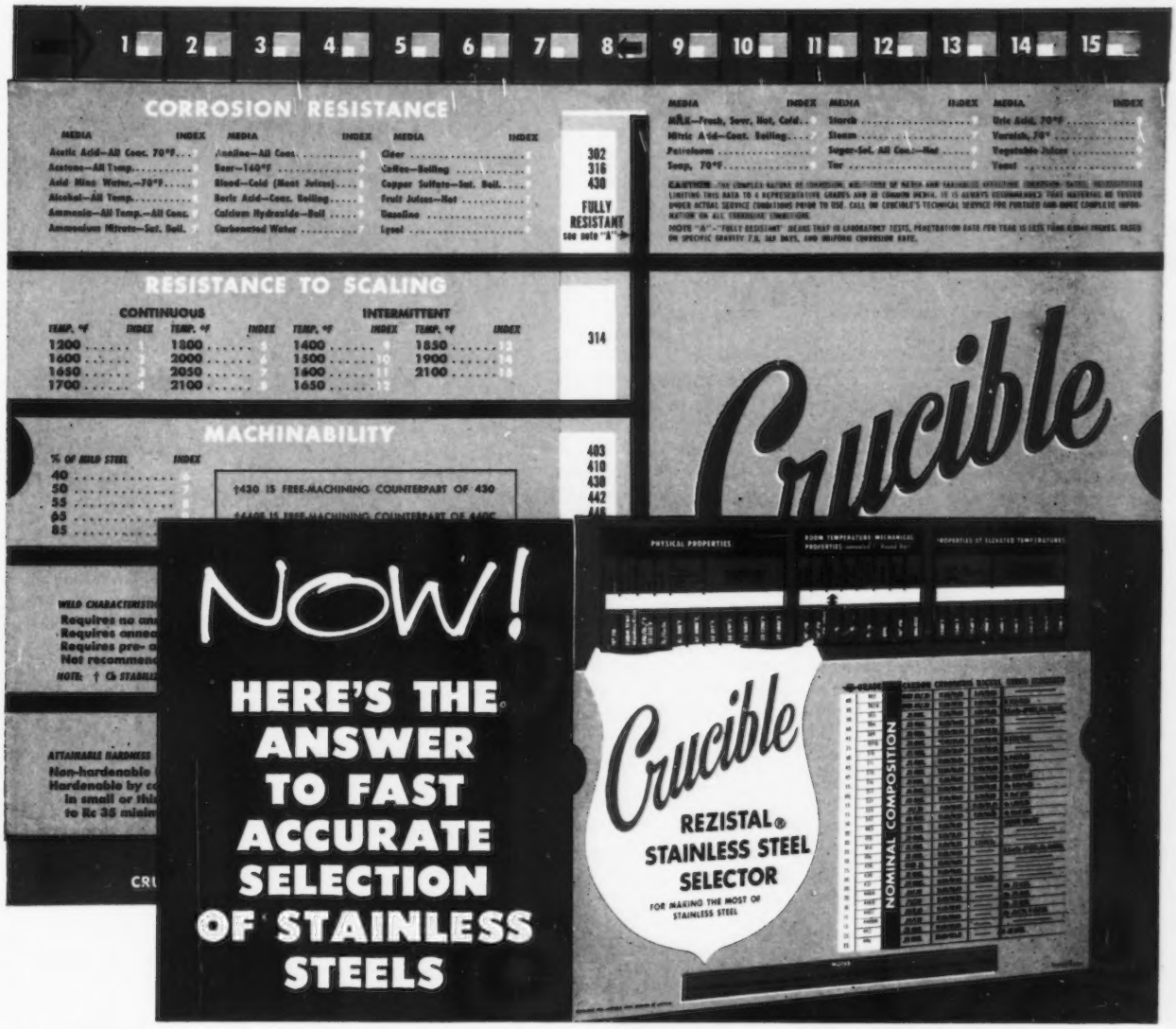
Brooks Rotameters. (Bulletin 100) Contains details of contents of Brooks Rotameter Flow Handbook, which is composed of 225 pages handsomely bound in a sturdy 2½ inch post-type cover. This is divided into six chapters, each a complete unit in itself, covering all phases of Rotameter applications in laboratory, research and industrial pilot plant and allied processing fields. Bulletin free. Handbook price $20.00. Brooks Rotameter Co., Eighth near Franconia Avenue, Lansdale, Pa.

Basic Facts About the Hynes Tubular Electric Heater. (Bulletin 202) Describes and illustrates component parts of heaters; also explains characteristics of electric heating and operating comparisons with steam. Turbine Equipment Co., Hynes Electric Heating Div., P. O. Box 578, Westfield, N. J.

Conax Thermocouples and Packing Glands. (Catalogue 1530) Illustrates and describes full line of Conax products, including Bare Wire Thermocouple Glands which are available with Neoprene, Teflon or powdered Talc sealants and provide only practical method for sealing unshielded thermocouples in any chamber operating above or below atmospheric pressures. Conax Corp., 4515 Main street, Buffalo 21, N. Y.

Chemical and Process Equipment, Steel and Alloy Plate. (Catalogue) Contains illustrated sales copy and basic product sections, complete with operating, design and application text, charts, diagrams, tables, and on-the-job photos. Also details facilities for plate fabrication. Colonial Iron Works Co., 17643 St. Clair Avenue, Cleveland 10, Ohio.

Cochrane Zeo-Flo Softeners. (Bulletin) Describes new Zeo-Flo sodium zeolite softener, specially designed for small and medium size industrial plants, apartment houses, etc. Also includes information on operation, design, dimensions and capacities. Cochrane Corp., 17th street below Allegheny Avenue, Philadelphia 32, Pa.



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The Board Mill Superintendent And Process Control Instrumentation

G. C. Ehemann

Former Plant Engineer, Ohio Boxboard Co., Rittman, Ohio

George C. Ehemann, Jr., died of a heart attack on December 23, 1953.

Mr. Ehemann was born in Memphis, Tenn., on August 23, 1910, and was graduated as a mechanical engineer from the Carnegie Institute of Technology in 1932.

From 1933 to 1946 he was employed as an engineer by the Carnegie Illinois Steel Corp., Duquesne, Pa. In 1946, he joined the engineering staff of the Ohio Boxboard Co.

He has a number of papers on engineering and instrumentation in paper mills to his credit.

The superintendents of today's board mills have at their disposal many process improvements unknown or unused only a few years ago. The superintendent who makes best use of these improvements has a long head start in the race for higher quality and more production at lower costs. Of these improvements, process control instrumentation is one which is old in many other fields, but which must be faced and mastered by the board mill superintendent if it is to be put to best use in our industry.

The application of control instruments cannot be left to the engineer or to the instrument manufacturer. They must help, of course, but their basic job is to keep the superintendent advised of equipment that is available and to solve the technical problems that arise in the selection, installation, adjustment, and maintenance of the various components of a control system.

The superintendent, in turn, with his experience and daily contacts, is in best position to analyze his mill and the working procedures of his people to determine where process control instrumentation can be applied and where it will pay off.

Instruments cannot supplant the skill that comes from long experience in dealing with the many elusive variable that are a part of papermaking. The variables that cannot be isolated and continuously measured have kept papermaking among the arts. Those variables that can be isolated and continuously measured, however, are subject to control by instruments.

At our present level of knowledge, it is unlikely that any of us would attempt direct automatic control of an elusive papermaking variable like hydration. But, on the other hand, we all know that it is usually quite practical to measure and control such variables as temperature, pressure, liquid level, pH, etc.

It is fairly safe to say that any variable that can be continuously measured is subject to automatic instrument control. Where do these variables occur in the board making process? And is it economically advantageous to apply instruments to control them?

There are no "pat" answers to these questions. Each situation in each mill requires individual examination. In order to make this study, the superintendent needs certain simple, but basic information. Let's go over some of this information in a just-to-get-acquainted sort of way.

Off-On vs. Proportional Control

One of the fundamental principles of all control instruments is that they must let the controlled variable deviate from the nominal setting. From this deviation a force is derived which is used to correct the deviation permissible and the limits on rate of change that determine the choice of control equipment.

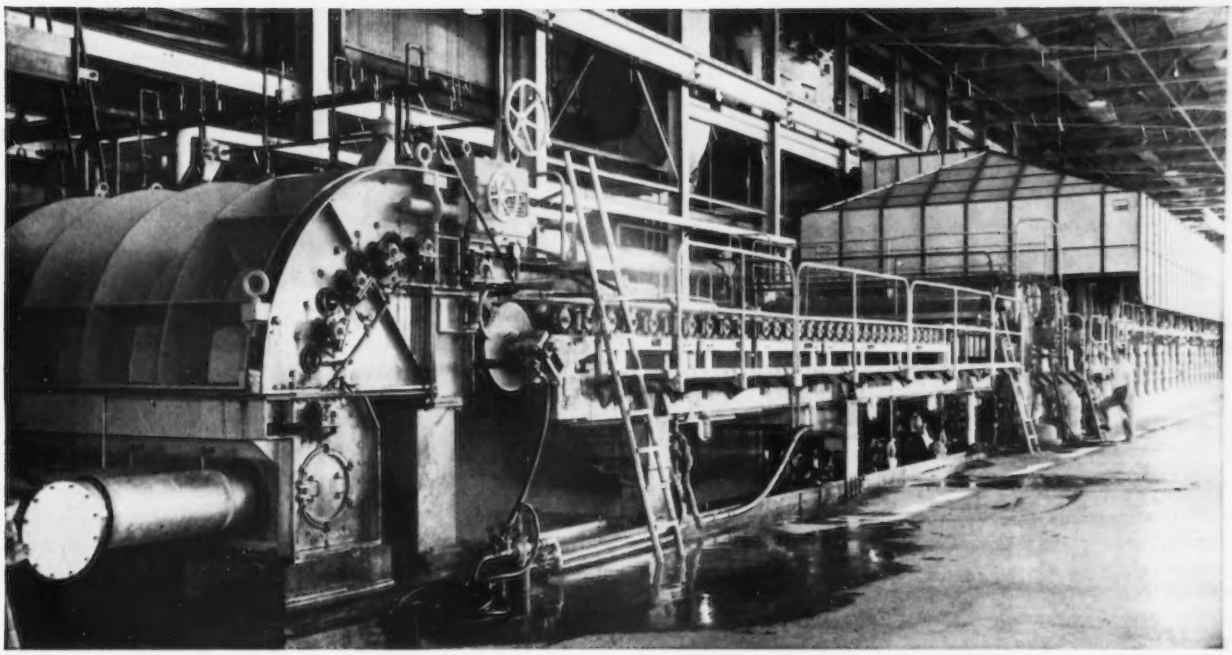
If it were desired to control the operation of a sump pump to keep drainage water from overflowing a sump, most of us would probably choose a simple float switch. This switch would turn the pumping process off when the water level got low and turn it on again when the water level got high. This control system is an example of Off-On control.

Off-On control could be applied instead to a valve in the discharge line of this same sump pump, although it is unlikely we would actually do it that way. In this case, the pump would run continuously; and a control system of some kind (perhaps the float switch again) would close the valve when the level got low and open it when the level got high.

It would not be necessary, of course, for the valve to go all the way closed or all the way open; but adjustable stops could be used so that the nearly closed position would pass just a little less than enough water, and the nearly open position would pass just a little more than enough to keep up with the incoming water. This valve adjustment would make the Off-On control less drastic; and, if the incoming flow didn't vary too much, would permit the level to be held within much closer limits. In other words, the dead band, the level change during which the controller does nothing, could be narrowed.

The dead band, be it wide or narrow, is characteristic of Off-On control. If the control system is in the OFF condition, it stays there until the controlled variable reaches the ON limit. The control system then changes to the ON condition and stays there through the dead band until the controllable variable reaches the OFF limit. There is no happy medium. There is no exact control setting, only a range with upper and lower limits.

If the valve in the discharge line of the sump pump were arranged to be operated directly from a float (as a float-operated butterfly valve), there would be some position of the float at which the valve is completely closed, and some other position of the float at which the valve is fully open. Between these two positions, any change in water level will cause a corresponding change in the valve opening. This is called Proportional control.



Most parts of this Fourdrinier that come in contact with the stock are either covered with stainless, or are made of this corrosion resistant metal. Included are the head box, save-alls and forming board.

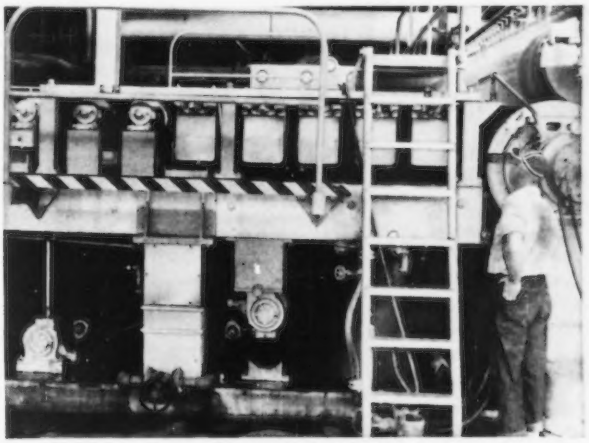
STAINLESS STEEL ON GUARD IN NEW FOURDRINIER

Stainless steel safeguards all vital parts of this new Fourdrinier machine that come in contact with paper stock. The equipment was installed recently in a Midwestern mill to handle stock from semi-chemical pulp.

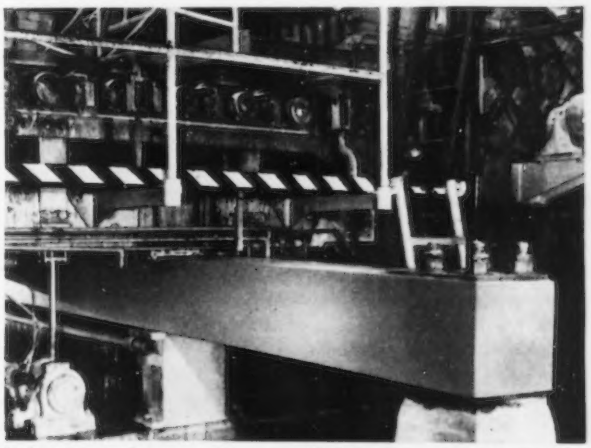
For Fourdriniers and other wet processing applications in your mill, specify Armco Stainless Steel. It fights corrosion and helps prevent slime accumulation. It saves cleaning time and reduces maintenance costs.

Stainless helps boost paper quality too—leads to higher profits through lower costs and fewer rejections.

Write us for complete information on the many uses for Armco Stainless Steel in pulp and paper mill equipment. Our engineers will gladly work with you and your equipment fabricators to help determine which grades best suit your needs.



Five suction boxes also are made of durable stainless steel.



Light gage stainless covers are welded to the rails and cantilever beams to protect the carbon steel against acid white water corrosion.

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With this system, the water level will not fluctuate up and down as with Off-On control, but the water will rise to a level at which the corresponding valve opening will let water away from the pump just as fast as water is coming into the sump.

This range, within which the control system will establish equilibrium at a value dependent upon the process rate, is typical of Proportional control systems. It is called the throttling range or proportional band. In the case of the float-operated butterfly valve, a change in the length of the float arm will change the width of the proportional band.

Pneumatic Control System

When we think of automatic process control, we usually think of more complicated devices than those devices we have been talking about. The most common of these latter devices is the pneumatic system. A pneumatic control system most frequently consists of a pneumatic control instrument, with a suitable measuring element, connected to a pneumatically-operated valve.

The instrument is provided with an index which may be set to the desired value of the controlled quantity. In a proportional controller, the point to which the index is set becomes the midpoint of the proportional band, or throttling range. It is not necessarily the point at which the system will control, but only the point at which the valve will be half-way open.

The instrument is arranged to receive a measurement, compare this measurement against the set point of the index, and to send out an air pressure signal which is to control the position of the valve. Instrument makers have standardized on an instrument output air pressure signal of 3 p.s.i. to 15 p.s.i.

Pneumatic control valves are built to be closed at 3 p.s.i. and wide open at 15 p.s.i.; and to assume any intermediate position corresponding to any pressure between 3 and 15 p.s.i. Since 9 p.s.i. is half-way between 3 and 15, the valve will be half-way open at an instrument output air pressure signal of 9 p.s.i.

Control valves can be bought to operate in the opposite direction, open at 3 p.s.i. and closed at 15 p.s.i. Valves are frequently chosen to operate in the direction which will make the systems "fail safe" in case of loss of air pressure.

In our mill, we have standardized on valves which are "open-to-open." Our early experience in using the "fail safe" system resulted in more trouble through confusion than was avoided during control failures.

Control valves will assume the proper position in response to the 3-15 p.s.i. air pressure signal either because they are operated by a diaphragm opposed by a spring; or, in the case of large valves or air-cylinder operated valves, because they have a valve positioner mounted on them. A valve positioner includes a pilot valve operated by a diaphragm opposed by a spring, which admits high pressure air to one side or the other of a large diaphragm or air cylinder, forcing the valve to exactly the right position.

In a proportional control instrument, when the measured quantity is equal to the instrument set point, the instrument output air pressure signal is 9 p.s.i. and the controlled valve is half-way open. As the measured quantity changes, the instrument output air pressure changes continuously until it is 3 p.s.i. or 15 p.s.i. at the limits of the proportional band.

The proportional band is usually expressed in percent of the full range of the instrument, and is adjustable except in the case of very simple, low cost instruments. For example: Let's return to the sump pump used in previous illustrations. Assume that the sump is eight feet deep and that we have selected a controller with a range of 0 to 10 ft. of water. Assume also that we want the pump discharge valve to be closed when there is two feet of water (or less) in the sump, and that we want it wide open if the water rises as high as seven feet. From two feet to seven feet is a five foot throttling range; or a proportional band of 50 percent of the 10 ft. range of the instrument. The instrument index would be set half-way in the throttling range or at 4½ feet of water.

The width of the proportional band is extremely important in process control work. A narrow band will tend to hold the controlled variable closer to the instrument set point, but too narrow a band is likely ot cause rapid changes in flow rate and to be unstable. A wide band gives stability, slow changes in flow rate, and makes use of more of the capacity of the system in evening our flow rates; but too wide a band will be sluggish and may settle down to control with a large deviation from the instrument set point.

This deviation is called Offset. Offset is not an error, yet many operators on the floor tend to consider it so. In a proportional controller, we have already seen that the index set point represents the middle of the proportional band; and that when the measured variable (or the instrument pen) comes to the set point, the instrument output pressure will be 9 p.s.i. and the valve will be half-way open. If, however, the process requires a flow rate which requires the valve to be either more open or more closed, the process will settle down at some other position within the proportional band than with a narrow one.

System Capacity and Process Lag

If measurement of the variable to be controlled is not a problem, then System Capacity and Process Lag become the dominant factors in whether automatic process control is simple or impractical.

System Capacity is the flywheel effect that keeps the process from changing much while the corrections made by the control system are getting through the Process Lag.

In our example of the sump pump control, it is obvious that it would be simpler to precisely control the water level if the sump were 10 feet in diameter than if it were one foot in diameter. Large capacity in the sump (in proportion to the water flowing to it) would require less rapid movement of the valve for a given change in water level. The process lag in this system, however, is almost zero. As soon as the valve changes position, it immediately has full effect on the water level in the sump. Under these conditions, a very large sump capacity isn't needed.

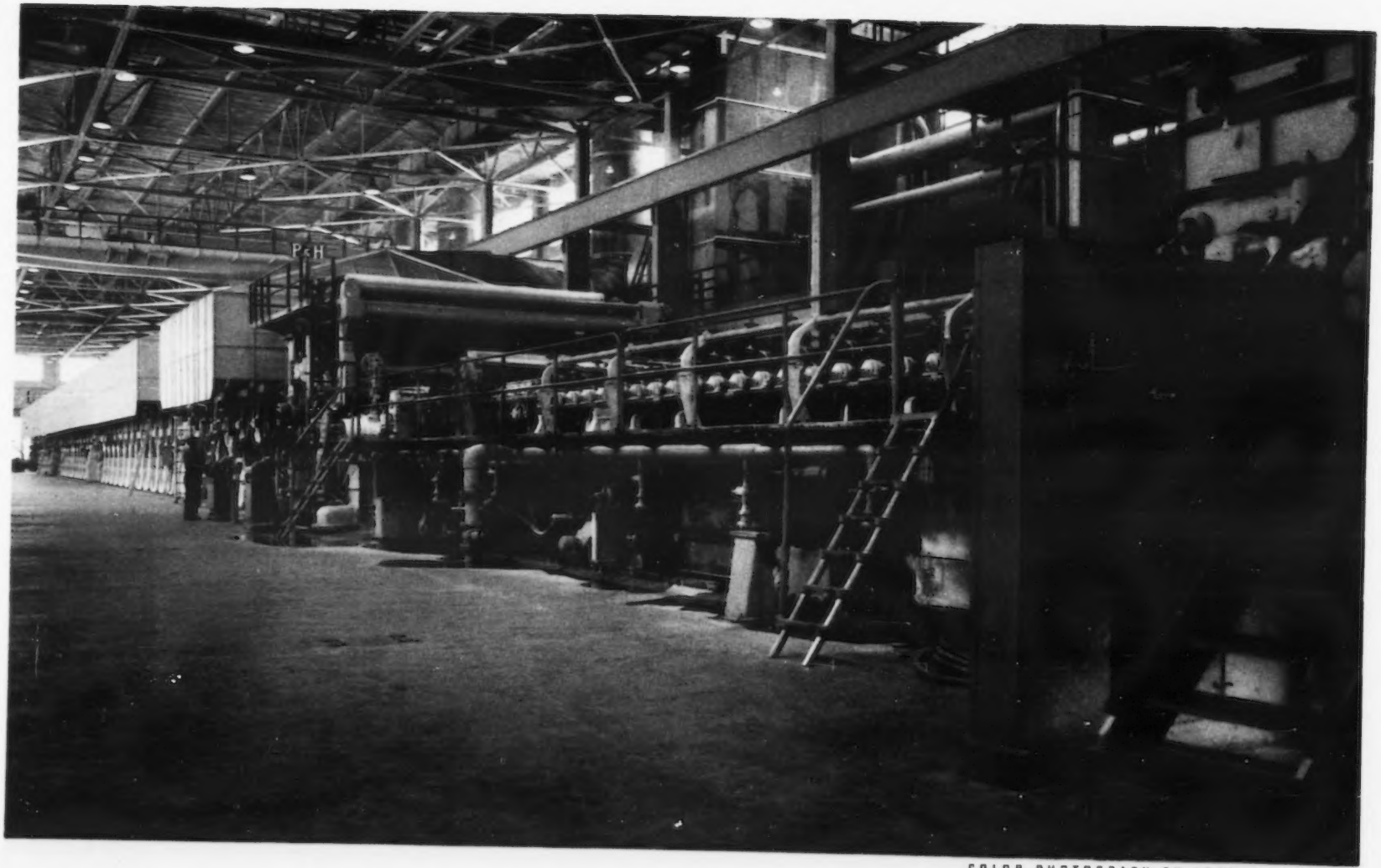
Consider, however, the case of a continuous filler stock Hydrapulper where the stock extraction rate is controlled by a valve after the pulper extraction pump, and the stock flows through a cleaning system, over deckers, and into a stock chest. A control instrument may be applied to the level in the chest to control the rate of extraction from the Hydrapulper. The process lag in this case is the time required for a flow change, made by the valve, to get through the cleaning system, over the deckers, and into the chest.

If the chest is too small and the level controller calls for more stock, the level will be so low by the time the new stock flow rate gets there that the controller will be calling for still more stock to catch up. When this stock comes over, the chest will catch up and then get too full. The system is hunting. In order to prevent hunting, the longer the process time lag, the larger the system capacity has to be for equivalent control precision.

Hunting, or instability, could probably be avoided even with the small chest by widening the proportional band — in other words, using more of the chest to take care of flow rate changes. Most of the chests found in board machines are big enough for a stable system of this kind provided we are willing to use a wide band, and not demand that the chest be operated within a foot or two of full all the time.

Large process time lags or small capacities demand wide proportional bands to prevent hunting. Wide proportional bands permit a great offset. In some processes, a large offset is not permissible.

If it is necessary to eliminate offset, instrument builders will include a RE-



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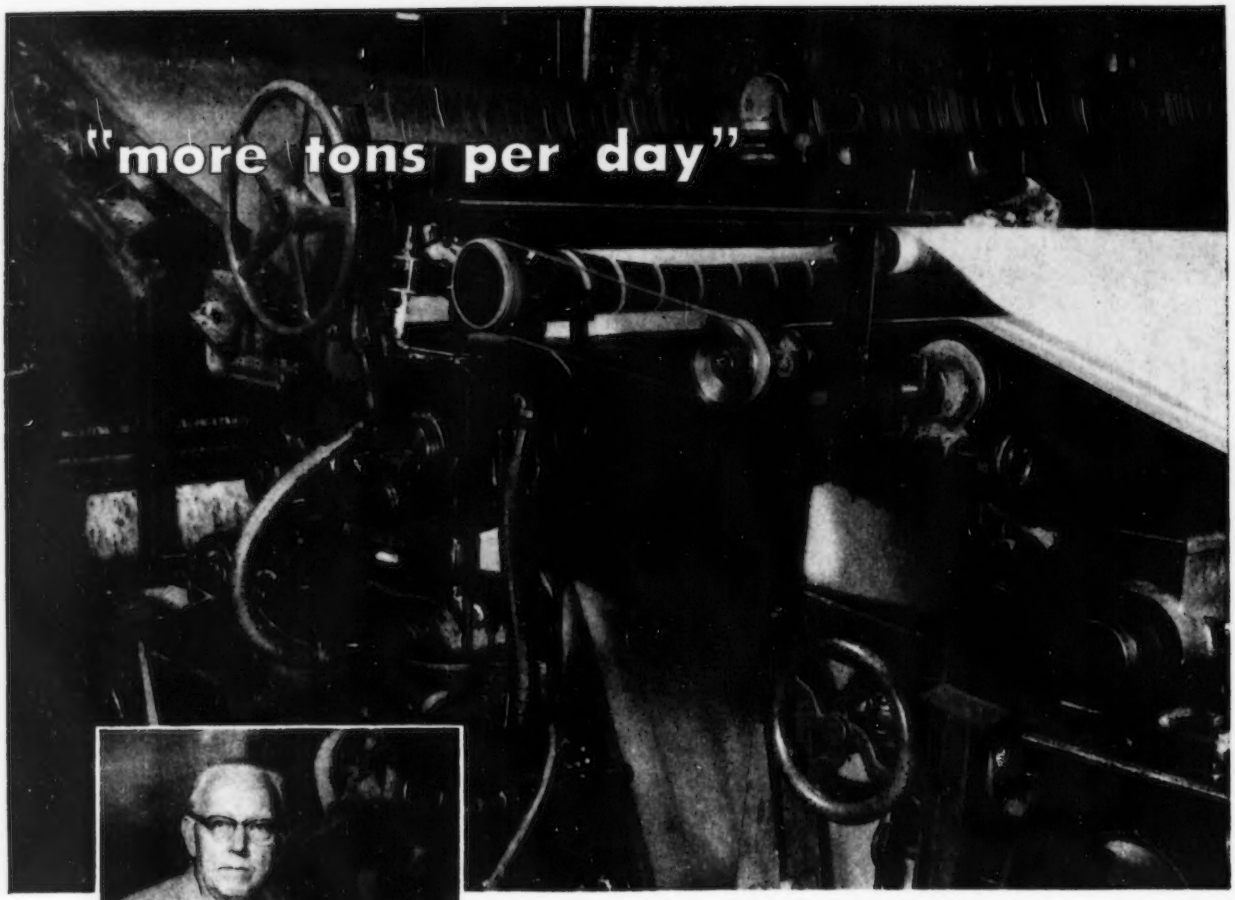
216" BELOIT MACHINE built for West Virginia Pulp and Paper Company's mill at Covington, Virginia. Efficient production of high-quality food-container board is helped by features such as air-cushioned headbox, specially designed press section, air guides for wire and felts, heavy-duty pneumatic reel, and high-speed shear-cut winder. The Beloit Differential Drive holds accurately selected draws without variation, thus raising sheet tests and sharply cutting machine breaks.



STEVENS & THOMPSON PAPER COMPANY, Greenwich, New York, produces tissue, toweling and napkin on six machines. For over 35 years they have used Albany Felts on their single-cylinder tissue machines. Charles Howland (left), Mill Superintendent, reports "more tons per day" with Albany Felts.

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SET device in the instrument. A RESET device will gradually shift the proportional band up or down until the controlled variable agrees with the index set point. RESET devices are adjustable as to the rate at which they will reduce the offset in a proportional controller.

Reset with a wide proportional band will often permit satisfactory control of processes having a considerable lag. We avoid using reset in stock flow controls whenever we can, however, because we believe that slow changes in stock flow rates are usually more important than precise control points.

In some cases, process lag can be so great that automatic control can become impractical. As an example: consider a cylinder machine making alkaline jute test liner. It might be desirable to add caustic in the Hydrapulper at a rate which would maintain a pH of 10 in the vats. In this case, a measurement would be made at the vats and control would take place way back at the Hydrapulper with at least an hour of process time lag between the control and the measurement point. It is very unlikely that such a system would work at all. In order to avoid this long process time lag, it would probably be simplest to determine what pH in the Hydrapulper was usually required to keep the vat pH within approximate desired limits and then apply the pH controller to the Hydrapulper stock.

Long process time lags are frequently circumvented by another type control system known as Off-On-Interrupted control. The principle of the system is that a deviation from control point causes a small movement of the controlled device or valve and then the system is interrupted by a timer which prevents further movement of the control until time enough has elapsed for the change to be felt through the process. The Hurletron caliper control is an example of the Off-On-Interrupted system used to provide precise control with a long process lag.

Automatic Process Control Costs

Any consideration of the application of process control instruments must necessarily be concerned with costs versus the value of benefits. The cost of an installation for automatic process control will depend on the variable to be measured, the precision required, the size of the valve or complexity of the controlling device, and other circumstances peculiar to each installation.

In order to get a rough idea of the range in cost of automatic controls, we made a list of all of the control installations in our plant. From this list, we deleted all instruments which were used in unusual applications. This deletion left a list of 85 automatic control systems which ranged in total cost from $539 to $2,748. These costs include the price of the instrument, the price of the valve or other control device, and the entire cost of installation, excluding assembling the valve into the pipe line.

The average installed cost of this list of 85 control systems was $1,272.50. The median cost, the cost of instrument No. 43 on our list, was $1,131.

The median instrument may be of interest as an illustration of costs since there are just as many less expensive installations as there are more expensive installations on our list. The median cost installation is a headbox level control system on our No. 2 Paper Machine. It is used to control the level of one of the stocks in the machine stuff box and replaces the conventional overflow which normally maintains stock level ahead of the metering gate. The system consists of a bubble tube and air supply device to detect the level, a recording proportional controller with reset, and a 4" V-port diaphragm operated stock valve. The costs were as follows:

Base Instrument	$499
Instrument Extras	72
Installation Labor	44
Installation Material	29
Valve	487
TOTAL	$1,131

The instrument next to the median, No. 42 on our list of 85, happens to be a temperature control system for the filler Hydrapulper on our No. 3 machine. This system controls the admission of steam to the Hydrapulper in order to maintain constant temperature. The aparatus consists of a recording proportional temperature controller with reset and a 6" double-seated, balanced, diaphragm-operated, steam valve. The costs on this system were:

Base Instrument	$505
Instrument Extras	49
Installation Labor	38
Installation Material	19
Valve	515
TOTAL	$1,126

Instrument No. 44 immediately above the median was a duplicate of the median instrument.

In the range of costs on our list from $539 to $2,748, the lowest cost system was a simple level controller maintaining level in a white water storage chest. The top-cost installation was a consistency regulator.

Between these two extremes are process control instruments for various purposes, some individual for an isolated purpose, and some assembled together for nearly complete process control.

In the vast majority of automatic process control instrument installation purposes, some individual for an isolated purpose, and some assembled together for nearly complete process control.

In the vast majority of automatic process control instrument installations in a board mill, the principal costs are made up of the base instrument and the price of a valve to go in some kind of a pipe line. Standard instrument costs do not vary widely between manufacturers. The price range is principally concerned with the function to be performed, and for pneumatic controllers will be roughly between $250 and $550.

Valve costs, of course, vary widely depending upon size and service. You can pay almost any price for a valve and will usually get what you pay for.

In connection with valve costs, a word of caution as to valve sizing may be in order. Individuals unfamiliar with control installations sometimes select a control valve on the basis of the size of the pipe line. Actually, there is very little connection between the size of a pipe and the size of a control valve. A pipe line is sized on the basis of economic pumping costs or gravity flow characteristics depending upon the nature of the fluid being carried, the length of the pipe line and the number of fittings which must be used. The size of a control valve must be selected entirely independently in order to give adequate but reasonable pressure drop across the valve itself, in order to secure good control over the entire valve opening. It is not uncommon, for example, to find a control valve only half the pipe size.

Investment Return

Any money spent for automatic process control instrumentation must come back in the form of greater profits to the company. The investment must be returned in a reasonably short time or there is no point in spending the money in the first place. In a board mill, the opportunities for investment return lie in reduced operating costs, increased production, or improved quality.

One of the most obvious ways in which costs may be reduced is through reduction of the number of people required to operate a mill. One instrument will almost never eliminate a man, but a combination of a number of instruments with a few process changes can frequently make reductions in manpower requirements. As a rough rule of thumb, $9,000 in capital investment can be made to eliminate one man from the pay roll; or $27,000 to eliminate one man per shift. Such an investment will be returned after taxes in roughly five years.

Reduction in waste is another place to look for decreased costs through control instrumentation. Is water or fiber going to the sewer because some uncontrolled chest or cistern sometimes overflows? Is production sometimes sent back to the beater room because somebody can't watch all the variables at once? Are we using a higher cost fur-

nish than necessary in order that fluctuation in the process won't take the minimum quality below acceptable standards?

Opportunities for production increase with existing major facilities are not so easy to find as the cost reductions already mentioned. In our mill, we have noticed that most of our production increases through instrumentation are hard to put the finger on. They are usually associated with the elimination of some operating hazard that causes the operator to run slow to keep out of trouble. Other opportunities for production increase center around full use of processing equipment and the general production improvements that go with uniformity of processing.

It is usually quite difficult to place an exact dollar value on improvement of quality. Often, however, an indirect evaluation can be made by investigating production increases or cost reductions that could be made to bring the quality back down to its previous lower level. For example, if through uniform processing of top liner stock, poor bender were encountered less often, an approximation of the value of this improvement might be made by considering furnish cost reductions which would re-establish the former frequency of bender troubles.

Applications

Before closing, let's take a quick superficial walk through a board mill and look at some of the operations that are being performed manually and where methods of measurement and automatic control are available. Not all of these operations will justify automatic control: each would have to be analyzed in the particular mill for performance, cost, and investment return.

In the beater room, a pulper operator is adjusting the make-up water to keep the stock in the pulper at a uniform level. He adjusts a steam valve to keep the stock at a desired temperature. He controls the extraction rate from his pulper to keep the dump chest at a constant level. He adjusts the speed or water level in his deckers to properly accept stock and he dilutes the stock going to his chest in order to keep the consistency at an approximately uniform value.

From the dump chest, the stock goes to the jordans where the jordan tender adjusts the flow rate to keep the machine chest at a constant level. He adjusts the jordan setting to keep uniform power on the stock. He is adding alum to the top liner stock to set the size and to keep a uniform pH in the vat. He is adding a little water at the jordans to keep the consistency uniform going to the paper machine.

In the machine room, the machine tender adjust stock gates to keep the proper amount of stock flowing to each cylinder. He adjusts water valves to keep the vat levels at a uniform height for best formation. He feels and watches the felts and adjusts the jacks to secure the desired felt tensions. He has a fresh water make-up valve open to be sure that he won't run out of white water.

Down the machine, the back tender feels the draws and adjusts the sheet tension. He feels the sheet or gets moisture determinations that he uses to adjust the steam supply to the dryers. At the calenders, a solution is being applied where temperature affects the rate of absorption; and finally, at the rewinder, a fourth hand is adjusting a brake to keep uniform hardness in finished rolls.

In this quick trip through the mill, we haven't begun to uncover all of the spots where automatic process control might be considered. In the details of the papermaking process, each mill superintendent can find many more examples for consideration. He usually needs only to ask himself. "Can it be continuously measured?"

The mill superintendent cannot wait to be sold an instrument by an instrument manufacturer. Each step of the process in each individual mill is a separate case. The job of the superintendent makes him the one person in best position to ferret out the possible applications and determine the potential investment return on automatic process control instrumentation.

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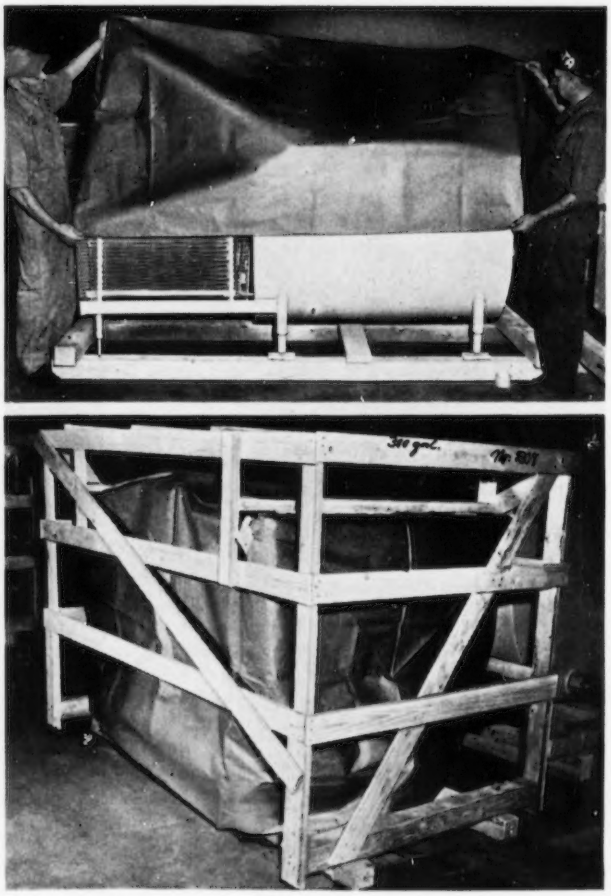
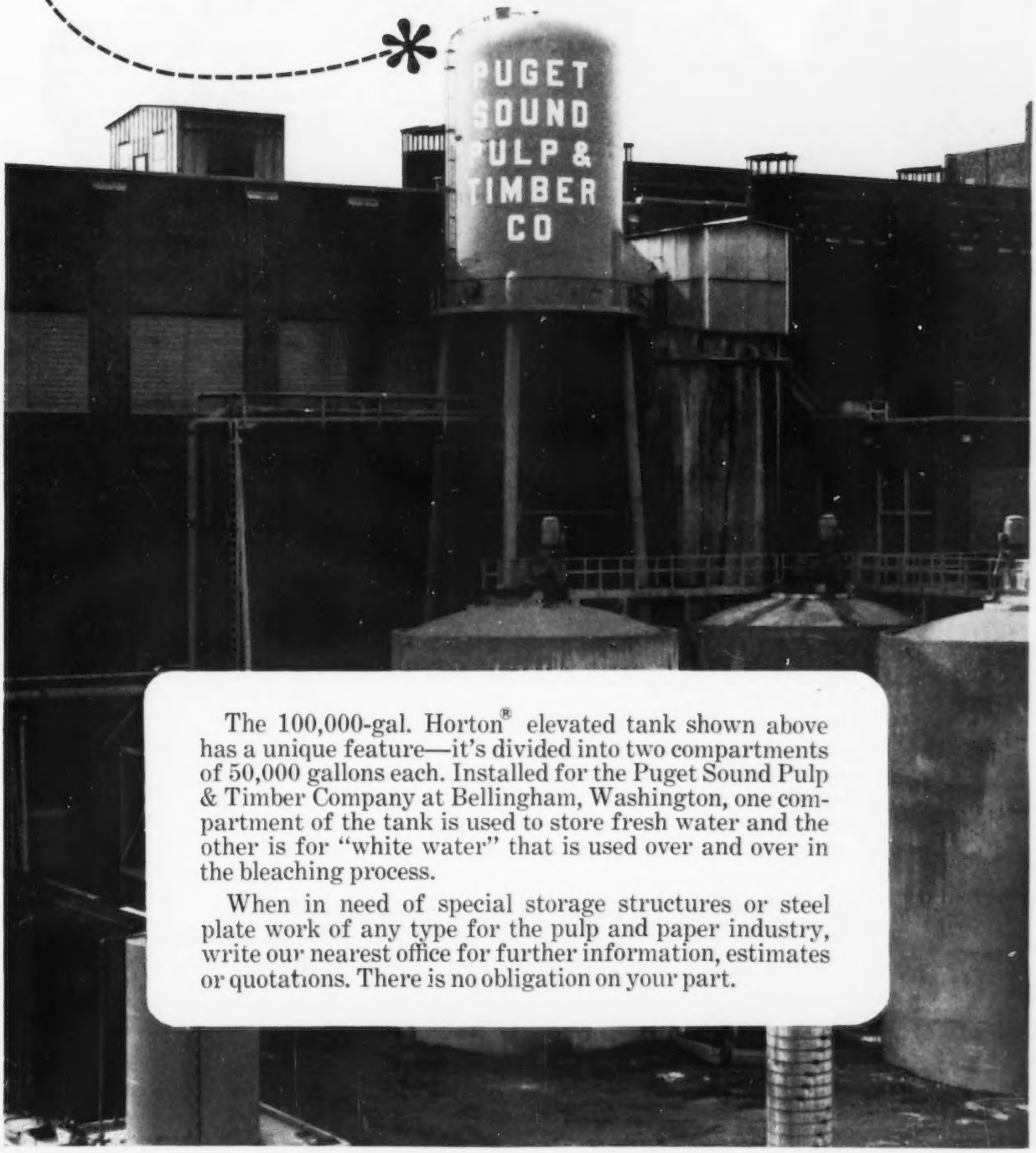
* Presented before the 34th Annual Convention of The American Pulp and Paper Mill Superintendents Assn., Atlanta Biltmore Hotel, Atlanta, Ga.



A saving of 14 minutes time has been accomplished by the use of new form-fitting Pro-Tex-Mor paper bags in the wrapping of MilKeeper farm tanks. The bags are tailored to the job by Central States Paper & Bag Co., St. Louis. They are especially treated to protect contents from scratches and abrasion by the crate.

Two Compartment Horton Elevated Tank

stores fresh water and white water



The 100,000-gal. Horton® elevated tank shown above has a unique feature—it's divided into two compartments of 50,000 gallons each. Installed for the Puget Sound Pulp & Timber Company at Bellingham, Washington, one compartment of the tank is used to store fresh water and the other is for "white water" that is used over and over in the bleaching process.

When in need of special storage structures or steel plate work of any type for the pulp and paper industry, write our nearest office for further information, estimates or quotations. There is no obligation on your part.

CHICAGO BRIDGE & IRON COMPANY

Atlanta, 3.....2142 Healey Building
Birmingham, 1.....1559 North 50th Street
Boston, 10.....1064—201 Devonshire Street
Chicago, 4.....2130 McCormick Building
Cleveland, 15.....2255 Midland Building
Detroit, 26.....1565 Lafayette Building
Houston, 2.....2163 C & L Life Building
Los Angeles, 17..1561 General Petroleum Building
New York, 6.....3333—165 Broadway Building
Philadelphia, 3..1665—1700 Walnut Street Building
Pittsburgh, 19.....3234 Alcoa Building
Salt Lake City, 4.....567 West 17th South Street
San Francisco, 4.....1577—200 Bush Street
Seattle, 1.....1368 Henry Building
Tulsa, 3.....1666 Hunt Building

Plants in BIRMINGHAM, CHICAGO, SALT LAKE CITY, and GREENVILLE, PA.
In Canada: HORTON STEEL WORKS LIMITED, FORT ERIE, ONT.

NEW EQUIPMENT AND SUPPLIES

Improved Design of Two Truck Attachments

Clark Equipment Co., Battle Creek, Mich. has improved the design of its Pul-Pac and Pusher units, both of which are available for factory or field installation on gas and electric Clippers and Carloader model fork trucks. The Pul-Pac is a combination push-pull attachment that permits the use of a thin carrying sheet instead of the conventional type wooden pallet. The Pusher Device, which does not have a gripper jaw on the rack, eliminates manual unloading of cartons, bags, drums or other material stored on pallets.

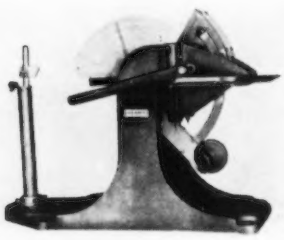
The former now has a gripper jaw that is detachable instead of being welded to the rack. It also has improved gripping action through use of a sequence valve which coordinates actuation of the gripper jaw with movement of the rack. The jaw is automatically closed before the rack moves forward.

Both units now have wider racks. The standard load plate is 5¼ inches wider than the previous plate. Complicated linkage and cam action has been eliminated, and the units can now handle off-center loads smoothly, it is said. Unequal stress is absorbed through a 1½-inch diameter solid equalizing shaft that distributes power equally through lever arms to the rack.

Economical Saveall

The Flotair Saveall is a product of Bulkley, Dunton Processes, Inc., 295 Madison Ave., New York 17, N. Y. It operates on the principle of dissolved air flotation and is said to be designed especially for low-cost furnishes which do not justify high expenditures for fiber recovery.

The manufacturer states that although this unit is less efficient than the company's Colloidair saveall, it is designed specifically to clarify white water and will meet compliance with state, regional, and local pollution requirements.

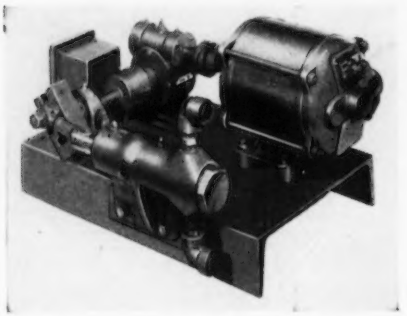


Puncture Tester Of Simple Design

Testing Machines, Inc., 123 W. 64th St., New York 23, N. Y., is now the exclusive manufacturer of the TMI-Beach Puncture Tester, an instrument based on an original design by General Electric Co.

The tester conforms to A.S.T.M. standard D 781-44T and is described as being so simple and reliable that it can be operated by production personnel as well as lab technicians, without special attention or manipulation.

Among the paper grades it is designed to test are corrugated board, vulcanized fiber, wall board, fibreboard, heavy liner, etc. Testing range for corrugated and fiberboard is up to 0.140 inches. The instrument stands 2½ feet high and weighs 250 lbs.



Proportioning Pump Can Be Run Stroke by Stroke

A motor-driven controlled volume pump for use in proportional feed systems is now available from Milton Roy Co., Station Q, 1300 E. Mermaid Lane, Philadelphia 18, Pa. It is said that a mechanical, single revolution clutch arrangement permits one stroke of the pump in response to an electrical signal to effect feed of an additive in proportion to main flow rate.

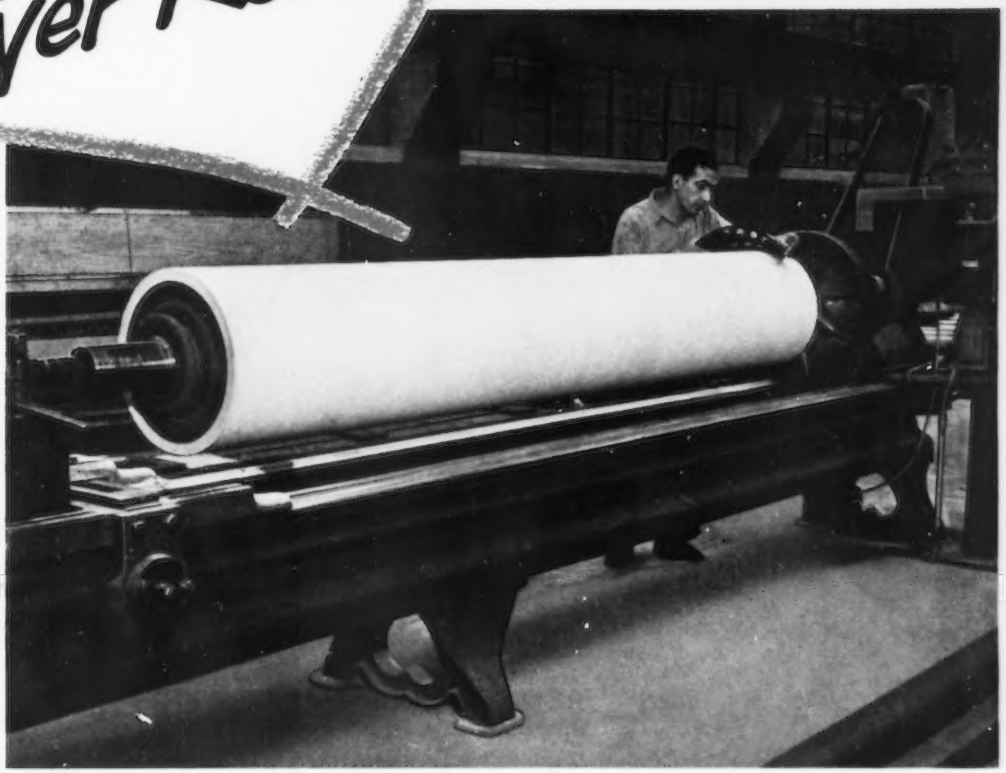
The signal may be transmitted by a timer, electrical contacts on a positive displacement meter, etc. The pump can be furnished for capacities from one pint to 1350 gallons per hour, against discharge pressures up to 50,000 pounds per square inch.

Defoaming Agent

Hart Products Corp., 1440 Broadway, New York 18, N. Y., has introduced Hartex Defoamer EC-16, a new defoaming agent for general use in the paper mill. The material, a smooth white paste, is offered as an effective defoaming agent in the head box of the paper machine and as an additive to top sizes.

The product is claimed to disperse readily in water without cooking, to produce no foam head on dissolving and agitating, and to have no rewetting properties, thereby eliminating feathering of ink on the finished stock. A technical data sheet and samples of the product are obtainable from the manufacturer.

Better Tyer Rolls... Through Research



A Buna-N type synthetic cover makes this Tyer roll superior to the rubber roll formerly used by this customer.

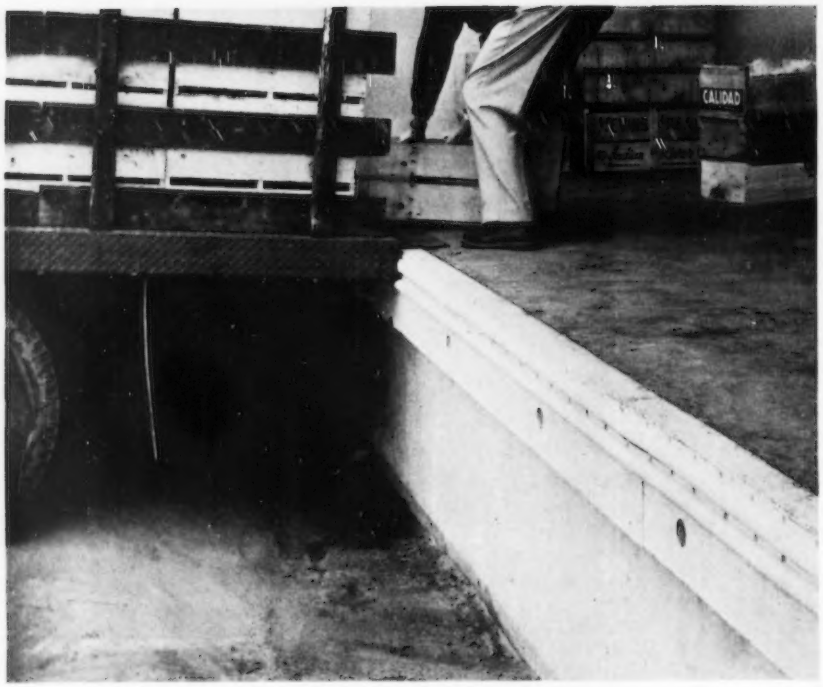
Rolls of this type have excellent resistance to fats, oils and solvents. They retain their original hardness and dimensions, and have good abrasive resistance. They can be used over a broad temperature range and are available in a wide variety of hardnesses.

Tyer began research on roll compounds using Buna-N before World War II. Since then, the leather, paper, textile and other industries have adopted Buna-N Tyer Rolls for specific applications—with excellent results. Perhaps a Buna-N type roll would solve your roll problem.

WRITE DEPT. P1 TODAY FOR CATALOG

TYER RUBBER ROLLS

TYER RUBBER COMPANY • ANDOVER, MASS. • ESTABLISHED IN 1856

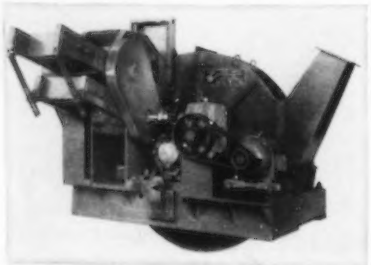


Neoprene Bumper to Protect Loading Docks

A shock-absorbing bumper has been introduced by Everguard Co., Box 143, Newport Beach, Calif. to prevent damaging wood facing boards on truck loading platforms. Mounted in continuous strips along the dock, it eliminates scraping and gouging, and prevents cracking from all but the most severe collisions, it is said. It also protects the truck paint at points of contact and guards against unsightly, rust-inducing dents, thus lowering maintenance for fleet owners.

The bumper is made of neoprene synthetic rubber that is said to be highly resistant to abrasion and tear, as well as to the rubber-deteriorating effects of sunlight, weather, oils, greases, acids, and various other chemicals. It resembles a half-round molding on a wide, flat base. The 14-foot sections are actually hollow, however, with longitudinal inner webs that provide rigidity along with the right amount of "bounce." Diameter of the curved portion is 1-¾ inches, while the base is about 2-¾ inches wide to provide half-inch mounting flanges at the sides. Wall thickness averages about a quarter-inch and each section is extruded in a continuous unit with no seams or joints between bumper and base.

Installation is simple. The bumper is applied with ordinary roofing nails spaced about three or four inches apart along the upper and lower flanges. The individual sections are merely abutted to form a strip of any desired length.

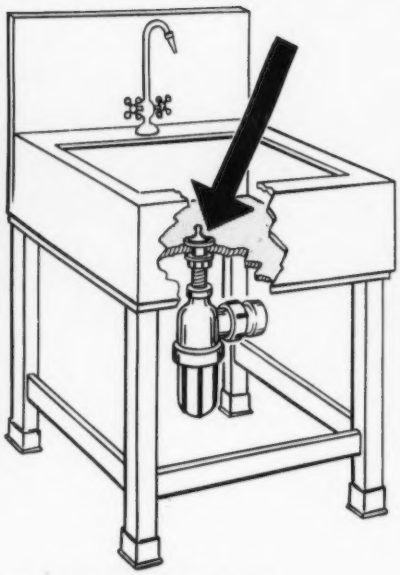


Wastewood Chipper With Synchronized Feed

With a spout feed mechanism synchronized to the speed of the disc, the Murco Four-Knife Wastewood Chipper, shown above, is now being produced by D. J. Murray Mfg. Co., Wausau, Wis. This 75-inch diameter chipper is offered to produce from saw mill refuse uniform pulpwood chips of specified quality.

According to the manufacturer, the chipper includes a damping device that permits utilization of all the wood yet holds slivers to the minimum. The chipper drive can be either an electric motor or a diesel engine. The mechanical spout feed operates from a reversible electric motor or from a power take-off from the diesel engine.

When operated at 500 r.p.m. and set to cut ⅝-inch to ¾-inch chips, the chipper is said to have a capacity of approximately 10 cords per hour. The unit weighs 24,000 pounds. It measures approximately 11½ feet long x 9-1/3 feet wide x 7-1/3 feet high. The chipper can be furnished with a blower housing, if pneumatic chip conveying is desired.



Chemical-Resistant Sink Trap for Labs

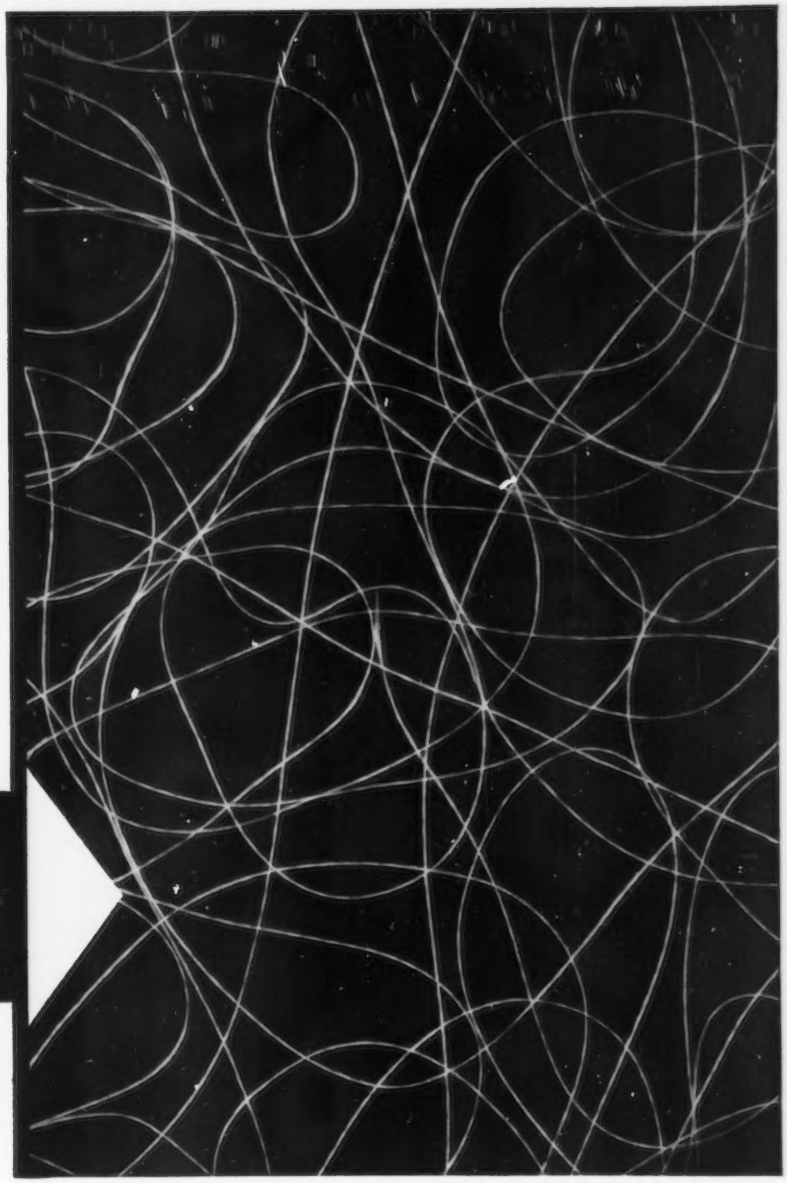
The Lanco Polyethylene Sink Trap is an all-polyethylene sink unit said to be chemical-and-acid resistant, dent-proof, unbreakable, and easy to install. It is manufactured by Arthur S. La Pine & Co., 6001 S. Knox Ave., Chicago 29, Ill.

The unit consists of a stopper, high level drain, strainer, lock nut, plug, trap, and outlet union. The trap may be unscrewed without tools. Joints are said to be watertight without washers.

Automatic Monitor For Parking Lots

Parcoa is the trade name of a new assembly of parking lot gates that are electronically controlled by "key" operating cards at the entrances. The assembly is offered to insure privacy of industrial parking lots and for municipal and institutional use. It is produced by Parking Corp. of America, 33 N. La Salle St., Chicago, Ill.

An individual holding a card drives to a receiving station in front of the gate (see arrow in photo above), inserts the "keyed" card in the station, and the gate rises to admit him to the lot or permits him to leave it. As he drives over an operating mechanism, the gate closes behind him.



FIBER PPG GLASS

Paper's companion for extra strength!

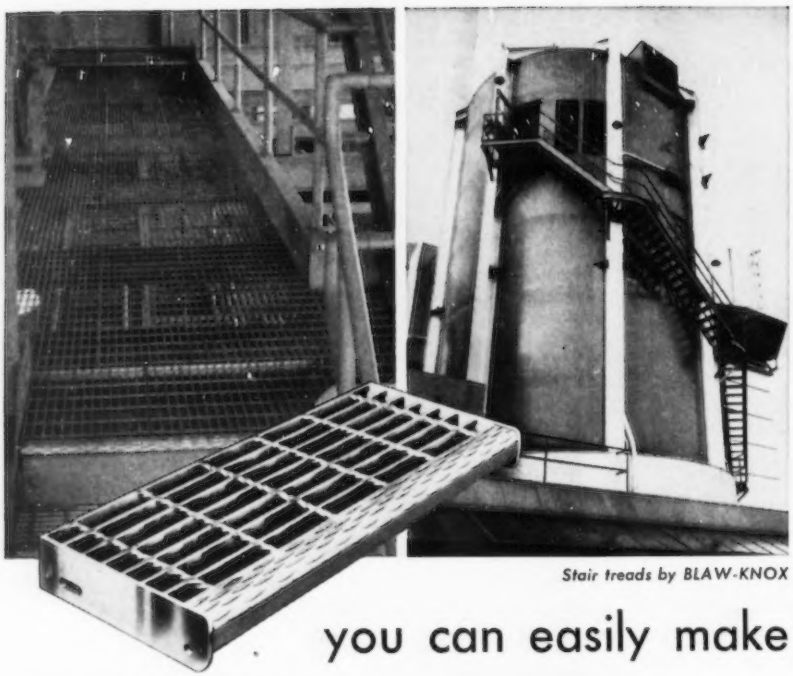
Pittsburgh Fiber Glass reinforcements provide the extra strength for paper's new important jobs. Once reinforced with Pittsburgh Fiber Glass, your paper products are ready to be used for many heavy duty industrial jobs—such as laminated sheets, manufacturer's joint tape and sealing tapes, to mention a few.

Important too, Pittsburgh Fiber Glass reinforcements give better flexibility to the finished sheet than other types of reinforcements.

Why not investigate the possibilities of adding PPG Fiber Glass to your paper products today. For complete information on PPG Fiber Glass products or arrangements for "in the plant" tests contact our executive offices or our district sales offices in Chicago, Cincinnati, Cleveland, Detroit, New York or Washington. Pittsburgh Plate Glass Company, One Gateway Center, Pittsburgh, Pennsylvania.

FIBER PPG GLASS PAINTS · GLASS · CHEMICALS · BRUSHES · PLASTICS

PITTSBURGH PLATE GLASS COMPANY



Stair treads by BLAW-KNOX

you can easily make

every step a safe step

Indoor or outdoor, you can rely on Blaw-Knox Stair Treads to provide the safety you want in your plant.

Designed for tremendous strength against impact, these stair treads are made with twisted cross bars and rolled diamond checkered plate nosing—as illustrated.

But, when desired, you can get treads with a twisted cross bar nosing or an abrasive nosing. And for specially slippery conditions we can supply you with serrated cross bar treads.

Just tell us what your application is and we'll offer our recommendations as to the best type of tread for your job.

Only Blaw-Knox Electroforged® Steel Grating and Stair Treads —have these five exclusive features:

1. rigid one-piece construction—easy to install
2. all surfaces accessible—easy to paint
3. no sharp corners to clog—self-cleaning
4. maximum open area—for light and ventilation
5. non-slip twisted crossbar—safe footing

A short note will bring you a copy of new Bulletin No. 2365-R —a dimensional sketch will bring you a quotation.

BLAW-KNOX

BLAW-KNOX COMPANY
2055 Farmers Bank Building • Pittsburgh 22, Pa.

BLAW-KNOX EQUIPMENT DIVISION GRATING DEPARTMENT

GRATING APPLICATIONS: floors • platforms • walkways • catwalks • stair treads • fan guards • shelving • and many other uses, both outdoors and indoors, for versatile steel grating.

Australian and New Zealand Notes

● The Commonwealth Government has decided to license the importation of 45,000 tons of Canadian newsprint during the twelve months commencing April 1, 1954. Permissible quantity of Canadian print for import during last licensing year was 25,000 tons. Of this year's quantity, 38,000 tons has been allocated to major metropolitan newspapers.

● Queries on the efficiency of Australian Paper Manufacturers Ltd. and its "unrealistic" approach to protection have been raised by the Tariff Board. The remarks are contained in the Board's latest report on Australia's paper manufacturing industry, released recently. The board recommended that the present tariff of £7 a ton on wrapping paper should be increased to £21 a ton subject to review in two years and this has been done. A.P.M. had asked for increased protection of £42 a ton. The board said it considered this was unrealistic and it "can only conclude that it reflects the general attitude of the company to profit levels under protection." A.P.M. had risen to an important place in Australian industry, the report said, and had shown great enterprise in assisting the foundation of an Australian paper industry. It was in the national interest for the industry to be self-reliant. But "the obvious over-statement of its duty requirement by A.P.M." had made the task of deciding a reasonable protection much more difficult than it should be.

● An unusual idea for the use of paper bags meant that nearly 100,000 children were able to sit down in comfort whilst waiting for the Queen to arrive at a schools demonstration in Adelaide, South Austraila, during the recent Royal Tour of that State. Each child had been given a large paper bag which was to be filled with paper and used as a cushion. Parents found the homemade cushions quite comfortable and many were used during the Royal Progress through Adelaide.

● New Zealand's paper and pulp industry should be freed from licensing, and the Government should let the respective companies work out their own objectives said the chairman of N. Z. Forest Products Ltd., Mr. David Henry, at the annual meeting in Auckland recently. His company, said Mr. Henry, did not want to be controlled by the "backroom boys" of the Bureau of Industry. N. Z. Forest Products had a clear field to manufacture wallboard, kraft paper and pulp and to mill timber.

Dependable Source for Chemical Raw Materials

Richard T. Trelfa (left), technical director, discusses test results with H. S. Faram, quality control manager, Watervliet Paper Company, Watervliet, Michigan

"Over the years, we've found Wyandotte Chemicals an excellent source of supply"

—R. T. Trelfa, Watervliet Paper Company

Papermaking is a two-phase job. You have to produce a top-quality stock, within practical bounds of cost, to insure saleability. And, equally important, you must be on the lookout for new ideas and methods to keep pace with progress.

The operations of the Watervliet Paper Company, Watervliet, Michigan, are a good example of modern papermaking efficiency. Quality is controlled every step of the way. This, of course, includes the quality of materials purchased, like Wyandotte Caustic and Chlorine. They use caustic in treating waste paper; chlorine is needed in pulpmaking and bacteria control.

With an eye to the future, Watervliet has established the country's first mill to produce a fully bleached, neutral sulphite, semi-chemical pulp from hardwood. Furthermore, they have pursued an active course of co-operation with Wyandotte's research. Some of the joint activities have been detailed engineering on soda-based hypochlorites, and the application of fine calcium carbonates to paper finishes.

Commenting on Wyandotte products and service, R. T. Trelfa, Watervliet's technical director, says, "Over the years, we've found Wyandotte an excellent source of supply from the standpoint of both product quality and dependability of service."

If you use alkalies, chlorine, wetting agents, solvents, fumigants, insecticides or other chemicals, contact Wyandotte for either product data or technical service. You will find Wyandotte large enough to care for your needs, yet not too large to be interested in your day-to-day problems. Tell us your requirements . . . we may have a chemical that will satisfy your needs, or will work with you in developing a new one. May we serve you. *Wyandotte Chemicals Corporation, Wyandotte, Michigan. Offices in principal cities.*

Wyandotte
CHEMICALS

HEADQUARTERS FOR ALKALIES

Soda Ash • Caustic Soda • Bicarbonate of Soda • Chlorine
Calcium Carbonate • Calcium Chloride • Glycols • Synthetic Detergents • Agricultural Insecticides • Soil Conditioners
Other Organic and Inorganic Chemicals

PRICES

MARKET WOOD PULP

Second Quarter Contract Prices Per Short Air-Dry Ton

	Delivered Basis		Varying Freight Allowances		
	U.S.	Canadian	Swedish	Finnish	Norwegian
Groundwood		‡$60.00/$95.00*	$77.50/$82.50§	$80.00/ —	
Kraft, Bleached ...	140.00/147.50	145.00/150.00	$140.00/142.50§		$142.50/ —
Semi-bleached, Kraft	130.00/135.00	130.00/135.00	$130.00/135.00§	130.00/135.00*	
Kraft, Unbl.	95.00/105.00	100.00/135.00	*105.00/110.00*	*105.00/135.00*	
Sulphite, Blchd. ...	140.00/ —	140.00/ —	$135.00/140.00*	140.00/ — *	$135.00/142.50*§
Sulphite, Unblchd. .	120.00/ —	120.00/ —	$115.00/122.00*	120.00/125.00*	
Sulphite, Unbl. Gl'sn.		124.00/ —	*124.00/ —		
Soda, Blchd.	140.00/ —	140.00/ —			

‡ F.o.b. Shipping Point. § On Dock Atlantic Ports. * Freight allowed.

RAG MARKET

New Domestic Cotton Cuttings

Delivered Mill Basis

	Per 100 lbs.
No. 1 White Shirts	$12.50/$13.00
No. 1 Unblchd. Muslins	14.50/ 15.00
Blchd. & Unblchd. Underwears ...	15.50/ 16.00
Blchd. Canton Flannels	11.00/ 11.50
No. 1 Light Silesias	7.50/ 8.00
No. 1 Light Prints	6.00/ 6.50
No. 1 Blue Overalls	7.25/ 7.75
Suntan Khakis	5.50/ 6.00
Fancy Shirts	6.50/ 7.00
Mixed Khakis	3.50/ 4.00
Cottonades	3.75/ 4.25
No. 1 Washables	3.50/ 3.75

Old Domestic Cotton Rags

(Prices to Dealers, F.o.b. Ship. Pt.)

	Per 100 lbs.
Mixed White	$2.75/$3.00
Cotton Pants & Overalls	2.00/ 2.25
Thirds and Blues, Repacked	1.65/ 1.75
No. 2 Roofing Rags	nominal

COTTON LINTERS

Memphis Market

F.o.b. Oilmills

	Apr. 27 Per 100 lbs.
Grade 1 n.a.	
2	n.a. / $9.00
3 1st cut—felting	8.00/ 6.50
4	6.00/ 4.50
5	4.25/ 3.25
6 * 2nd cut—chemical	3.00/ 3.00
7	3.00/ 3.00

* Based on 73% cellulose.

Bagging

(Prices to Dealers, F.o.b. N. Y.)

	Per 100 lbs.
Foreign Gunny	$4.00/$4.50
Foreign Scrap Burlap	3.00/ 3.75
Heavy Wool Tares	4.00/ 4.25
Austr. Wool Pouches	4.00/ 4.50
Domestic Manila Rope	5.50/ 6.00
Domestic No. 1 Sisal Strings	5.00/ 5.25

WASTE PAPER MARKET

Prices to mills, per ton, f.o.b. cars shipping point (includes brokers' fee.) These quotations are a partial indication of the price range or volume tonnage in each market on the date specified, as gathered from major dealers. SPECIAL PACKINGS AND SPOT TONNAGE NOT INCLUDED. Prices nominal. See TRENDS.

	New York	Boston	Chicago	Los Angeles
	May 1	May 1	May 3	May 1
No. 1 Mixed Paper.....	$8.00/ 9.00	$10.00/ 11.00	$7.00/ —	$13.00/ —
No. 1 News.....	12.00/ 13.00	12.00/ —	15.00/ —	13.00/ —
Overissue News	15.00/ 17.00	15.00/ 19.00	**20.00/ 22.00**	13.00/ —
Mill Wrappers	8.00/ 17.00	12.00/ 15.00	10.00/ —	11.00/ —
Old Corrugated Containers.....	13.00/ 15.00	**15.00/ 16.00**	16.00/ —	19.00/ —
No. 1 Sorted Br. Kraft Paper...	40.00/ 45.00	35.00/ 50.00	17.00/ —	45.00/ —
New Double Kr. Ld. Corr. Cuts	40.00/ 50.00	42.50/ 50.00	40.00/ 45.00	35.00/ 45.00
New 100% Kraft Corr. Cuts....	**55.00/ 60.00**	**50.00/ 60.00**	**60.00/** —	45.00/ —
New Br. Kraft Env. Cuts.....	70.00/ 75.00	**65.00/ 77.50**	65.00/ —	40.00/ 45.00
New Br. Kr. Bag Waste Prntd.	65.00/ 75.00	**65.00/ 75.00**	55.00/ —	35.00/ 45.00
No. 1 Groundwood Shvs.....	25.00/ 35.00	**25.00/ 30.00**	25.00/ —	29.00/ 35.00
White Newsblanks.....	**60.00/ 65.00**	45.00/ 55.00	**40.00/** —	50.00/ 55.00
No. 1 Soft Wht. Shvs., coated..	60.00/ 70.00	**70.00/ 80.00**	65.00/ —	— / —
Hd. Wht. Shvs.....	100.00/105.00	**95.00/110.00**	**100.00/** —	95.00/ —
Hd. Wht. Env. Cuts.....	120.00/130.00	**110.00/125.00**	**105.00/** —	105.00/ —
Col. Tab. Cards.....	45.00/ 55.00	**55.00/ 60.00**	50.00/ —	28.00/ —
Manila Tab. Cards, bales.....	**75.00/ 85.00**	80.00/ 85.00	**75.00/** —	55.00/ —
No. 1 Col. Ledger.....	37.00/ 45.00	**40.00/ 50.00**	45.00/ —	28.00/ —
White Ledger	57.50/ 65.00	**60.00/ 65.00**	55.00/ —	45.00/ —
Mixed Book & Mag.†.....	18.00/ 19.00	**18.00/ 22.50**	12.50/ —	— / —
No. 1 Rep'd. Hvy. Books‡.....	25.00/ 30.00	**25.00/ 35.00**	27.50/ —	9.50/ 12.00

† Includes Time & Life; no coarse groundwood. ‡ Not to exceed 10% groundwood. § Deld.

PRICES OF MATERIALS

Aluminum sulphate:
cml. bags, c.l. wks.....cwt. $1.85 / —
iron-free, c.l. wks.....cwt. 3.55 / —

Casein, acid prec.:
dom. sh. pt. c.l.....lb. .24 / .30
Arg. ex dock, duty paid..... .19 / .20
New Zeal. do. ..... .21 / .23

Caustic soda:
c.l. wks. solid, 76%.....cwt. 3.70 / —
flak. & grd. 400-lb. drums, c.l. 4.10 / —
liquid 50% tanks.... 2.55
liquid 70% tanks.... 2.65

China clay:
dom. air-float, c.l. wks.... ton 10.00
water-washed, lump, filler..ton 11.00
coating .....ton 17.60 /30.50
Imported, ex. ship....short ton 16.00 /30.00

Chlorine:
single-unit tanks, works...cwt. 2.93 / —
multiple unit, 2-5 cars per yr. 3.83 / 5.00

Formaldehyde:
USP, inh. dms. c.l. wks ...lb. .0666/ —
l.c.l., E. wks....lb. .071 / —

Lime:
hydrated bags, wks.....tons 14.50 /15.50

Gum rosin:
K, M, N, drms, c.l. Savan, cwt. 7.50 / 7.60

Rosin size:
70%, gum & pale grds., tank cars, south, sh. pt.....cwt. 6.60 / 6.65

Salt cake:
dom. bulk, c.l. wks.....ton 19.00 / —

Soda ash:
light, 58%, bags, wks.....cwt. 1.65
bulk .....cwt. 1.35

Sodium silicate, 40° Be.:
tank-cars, wks. .....cwt. 1.00 / —
drums, c.l. wks.....cwt. 1.35 / —

42° Be. WW,
tank-cars, wks. .....cwt. 1.60 / —
drums, c.l. wks.....cwt. 1.95 / —

Sodium peroxide:
dms. c.l. E. of Miss.....lb. .186
l.c.l. do .....lb. .191 / .201

Soybean, protein:
chem. isol., wks. c.l. bags..lb. .25 / .25½

Sulphuric acid:
60° Be. cbys. c.l. wks.....cwt. 1.75 / 2.00
l.c.l. wks. .....cwt. 2.30 / 2.45
tank-cars, wks. .....ton 16.30 /18.60

Sulphur:
crude, c.l. mines, contract, long ton 25.50 /27.50
f.o.b. vessels Gulf.....do. 27.50 /30.50

Sulphur dioxide:
liquid, coml. cyl., wks.....lb. .09
multi-unit cars .....lb. .0535

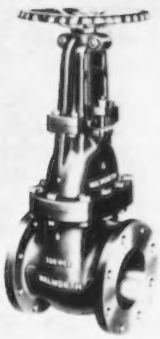
Starches:
corn, multiwalls, c.l. prod. plant:
pearl .....cwt. 6.39 / —
white, dextrines .....cwt. 7.78 / —
chlorinated .....cwt. 8.14 / —
potato, Idaho, c.l. wks. W. cwt. 6.30 / —
East, fr. all. 50 cents cwt.
potato, Maine, f.o.b. wks. cwt. {6.25 / — nominal}

Talc:
domestic, sacks, c.l. wks....ton 25.00 /30.00

Titanium dioxide:
anatase, c.l. deld. E. bags...lb. .22½/ .23
l.c.l. deld. .....lb. .23½/ .24
rutile, c.l. deld.....lb. .24½/ .25
l.c.l. deld. .....lb. .25½/ .26

Walworth

Valves and Fittings



WALWORTH No. 725FS OS&Y, Flanged, Special Alloy Wedge Gate Valves were developed especially for the pulp and paper industry. They are available in sizes from 2 to 12 inches for 200 pounds, and 14 to 24 inches for 150 pounds, non-shock service.

WALWORTH No. 928FS Swing Check Valves are recommended for use with No. 725FS Gate Valves. Like No. 725FS, they are designed to meet fully the requirements of the pulp and paper industry.

WALWORTH No. 716 is an OS&Y, Saddle Style, Wedge Gate Valve having body, bonnet, and wedge of Ni-Resist. The seat rings and stems are of 18-8 stainless steel. These valves are available in sizes ½ to 2", and complement the No. 725FS valves in the smaller sizes.

WALWORTH Pressure-Seal Cast Steel Gate Valves exemplify the greatest improvement in high-pressure, high-temperature valve design. The internal pressure keeps the body-to-bonnet joint tight. Series 600: 1½" and larger; Series 900: 3" and larger; Series 1500: 1" and larger.

WALWORTH No. 1700F Lubricated Plug Valves are available in a variety of materials for corrosive service. They assure long life and positive operation; are wrench or gear operated; have a working pressure of 200 pounds WOG; and are available in sizes from 1" to 8".

...proved performance in pulp and paper mills

For many years the Walworth Company has been producing valves designed for service in the pulp and paper industry. These valves are similar in design to regular, standard iron body gate valves, but, because of the conditions peculiar to the pulp and paper industry, the valves are made of corrosion resistant alloys. Years of satisfactory service have proved these alloy valves to be the most suitable for this special service.

Walworth manufactures valves and pipe fittings of steel, stainless steel, iron, and bronze. Illustrated are Walworth valves of latest design. For further information and details of Walworth's complete line of valves and fittings, see your local Walworth distributor, or write for catalog.

WALWORTH

Pulp and Paper Mill Division

60 East 42nd St., New York 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

NEWS OF SUPPLIERS

• LOCKPORT MACHINE CO., 112 Chestnut street, Lockport, N.Y., together with all rights to property, name, patterns and drawings, has been acquired by the Simco Paper Machinery Corp., of Brooklyn, N. Y. The Lockport business was reopened on May 1, 1954.

Lockport Machine Co., founded in 1896 by Wm. Muirhead, specialized in the design, production and sale of bag converting machinery until the illness and subsequent death of Mr. Muirhead forced a suspension of operation in 1948.

Now, as a division of Simco, the new Lockport Machine Co. will design and produce a modernized version of the bag converting machine which will incorporate the stand-up delivery essential to today's high speed production with the time-tested simplicity and rugged construction of the original models. Also, to better serve the needs of the continuous web converting industry, the Lockport name will be added to a modern line of garment bag, liner, tuber, aniline and oil ink multi-color printing presses and special purpose slitting and rewinding machinery.

Simco Paper Machinery Corp. will move their entire plant to the new Lockport address. Three departments will be operated under this name. The first will continue to make available complete facilities and engineering know-how to design and fabricate special purpose continuous web converting machinery. The second will expand the casting, fabricating, reconditioning, rubber or composition covering and complete machining of any paper roll cylinder. A newly organized third department will offer a supply of replacement parts to fit any Lockport paper converting machine now in existence together with a machine shop devoted to the forming and cutting of any replacement gear or the complete from-the-ground-up modernizing and rebuilding of any make or brand of paper converting machine.

• GEIGY CHEMICAL CORP. announces that Hubert A. Des Marais has joined the Industrial Chemicals Division and is assuming its managership.

Mr. Des Marais, until recently the general sales manager of Pennsylvania Salt Mfg. Co. of Washington, spent a number of years with General Dyestuff Corp. on the West Coast as technical sales manager. Prior to that he was employed by Chemical Paper Co. of Holyoke.

Mr. Des Marais will make his headquarters at the company's main office, 89 Barclay street, New York 8, N. Y.

• ELLIOTT CO.'s Crocker-Wheeler Division has named S. K. Hostetter, Jr., sales manager for the past year, general manager of the division. Mr. Hostetter joined Elliott Company in 1934. Before going to the Crocker-Wheeler Division he had been in the company's Washington office, first as a field engineer and then as district manager for ten years.

B. M. Prestholt R. F. Coltart

• LINK-BELT CO. has appointed two new West Coast sales managers, Rodney F. Coltart for the Central Pacific Division, with headquarters at the company's San Francisco plant, and Benjamin M. Prestholt for the Southern Pacific Division, with headquarters at the Los Angeles plant.

Mr. Coltart, recently a sales engineer at Link-Belt's Colmar, Pa., plant, started with the company in 1935.

Mr. Prestholt started his career with Link-Belt in 1936 in the engineering department of the company's Caldwell plant in Chicago.

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Add Bitusize "B" asphalt-emulsion "sizing" to beater stocks and you can be sure of maximum water-resistance and high dry strength in every fiber, from surface to surface, throughout the caliper.

Use it in producing all hard sized grades—carton, container, folding or specialty stocks.

Our Technical Representative in your area will gladly supply full information. He is at your service, too, whenever you have special problems in the production of water-resistant grades.

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Baltimore 3, Md. Columbus 15, Ohio
St. Louis 17, Mo. Mobile, Ala.
Baton Rouge 2, La. Tucson, Ariz.
Inglewood, Calif. Oakland 1, Calif.
Portland 7, Ore. Seattle, Wash.
Washington 5, D. C. San Juan 23, P. R.

A Job To Do?

Article II of the Constitution and By-Laws of The American Pulp and Paper Mill Superintendents Association sets up a four-fold purpose for the organization. Here it is:

> ***"A. To promote discussions of practical and professional matters pertaining to the pulp and paper industry in so far as matters may be discussed without conflicting with the established policies of mills.***
>
> ***B. To assist in the solution of problems confronting the industry.***
>
> ***C. To organize local divisions of the Association as needed so that divisional members may periodically meet, discuss their common problems, and listen to informative talks on matters which will help them to perform their respective duties in a more efficient manner.***
>
> ***D. To disseminate practical and helpful information on various phases of industry activity."***

The program of the 35th Annual Convention has been worked out with the above four-fold purpose in mind. The several sessions — two general sessions and six group meetings — have been planned to evoke discussions, to aid in the solution of problems, and to disseminate practical and helpful information.

There will be talks by leaders in the field of supervisory responsibility; papers on newer developments covering paper machine operation; a progressive coverage of high-yield pulping; a paperboard meeting of most effective proportions; an approach to engineering and maintenance subjects which is very practical; and a broad handling of chemical pulping and other segments of pulp and paper making technology and operation.

Mr. PULP and PAPERMAKER: Do you want to know more about pulp and papermaking? If you still have the urge to learn, make arrangements now to attend the 35th Annual Convention of The American Pulp and Paper Mill Superintendents Association.

The dates for the meeting are *June 21-23, 1954*. The place of the meeting is the Sheraton-Mt. Royal Hotel, Montreal, Canada.

Do not delay decision. Write or wire your hotel requirements today to Charles E. Smith, Montreal Tourist and Convention Bureau, Dominion Square Building, Room 923, Montreal 2, Canada.

Advertisement — The American Pulp and Paper Mill Superintendents Association, 327 South LaSalle Street, Chicago 4, Illinois.

NEWS OF ASSOCIATIONS

Details of NPA Spring Meeting

The Spring Meeting of the members of National Paperboard Assn. is to be held at Grove Park Inn, Ashville, N. C., May 23, 24, 25.

The Special Food Board Group of the association meets at 6:00 PM, Sunday, May 23.

General Membership Sessions are scheduled for the mornings of May 24, 25.

Meeting of the Board of Directors will be held Monday afternoon, May 24.

Marvin W. Swaim (First Vice-President of Alton Box Board Co., Alton, Ill.) is president of the association.

Ralph A. Powers (president, Robertson Paper Box Co., Inc., Montville, Conn.) and T. N. Bland (president, Fibreboard Products Inc., San Francisco, Calif.) are Vice-Presidents of the association.

Statistical Methods Conference

The Statistics Committee of TAPPI is cosponsoring a short course in the use of statistical methods in the pulp and paper industry with the University of Maine. This will be the third consecutive year that such a conference has been given. Last year it was held at Western Michigan College, Kalamazoo.

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PULP AND PAPER MILLS
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Reports, Consultation and Valuations
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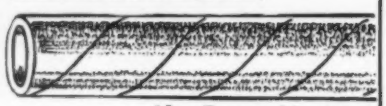

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Superintendents Local Meeting Dates

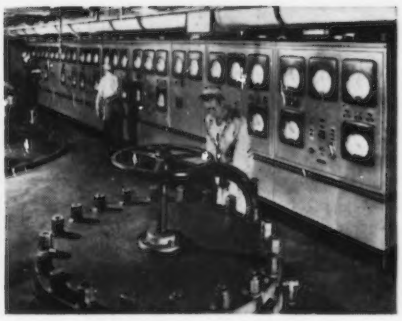
DATE	DIVISION	PLACE
May 14	Connecticut Valley	Roger Smith Hotel Holyoke, Mass.
May 14-15	Penjerdel, Spring Meeting	Yorktowne Hotel, York, Pa.
May 20	Michigan	Harris Hotel Kalamazoo, Mich.
May 20-21	Pacific Coast Joint TAPPI	Gearhart Hotel Gearhart, Ore.
June 4	Miami Valley Div.	Orr Felt & Blanket Co. Piqua, Ohio
Sept. 2-4	New York-Canadian	Saranac Inn Saranac Inn, N. Y.
Sept. 23-25	Northeastern Div.	Poland Spring House Poland Spring, Maine

TAPPI Local Meeting Dates

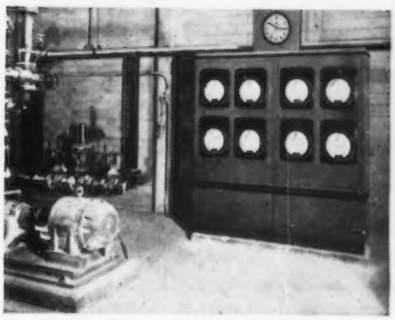
DATE	DIVISION	PLACE
May 11	Ohio Annual Meeting	Hartwell Country Club Cincinnati, Ohio
May 11	Lake States Annual Social Meeting	Butte des Morts Club Appleton, Wis.
May 11	Metropolitan District Empire State	Fraunces Tavern Pearl & Broad Sts., N.Y.C.
May 13	Northern District Empire State Ladies Night and Peddlers Party	Hotel Woodruff Ballroom Watertown, N. Y
May 14-15	Southeastern	Hotel De Soto, Savannah, Ga.
May 17	Chicago	Chicago Bar Assn. Chicago, Ill.
May 19	Eastern District Empire State	Milfranks Restaurant Glens Falls, N. Y.
May 27	Delaware Valley	Engineers Club 1317 Spruce Street, Philadelphia, Pa.
June 4	Central District Empire State	University Club, 431 E. Fayette St., Syracuse, N. Y.
June 10-12	Empire State Annual Meeting	White Face Inn Saranac Lake, N. Y.

National Meetings are shown under "Remember These Dates" on page 5.

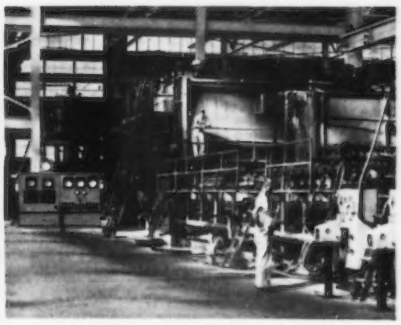
Alkaline Pulp Digester Control
Riegel Carolina Corp.



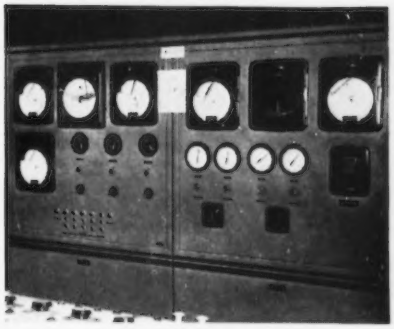
Sulphite Pulp Digester Control
Weyerhaeuser, Pulp Div.



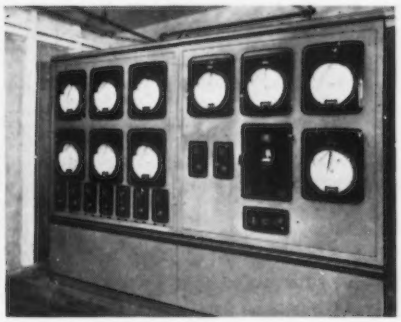
Recausticizing Control
Brown Co.



Paper Machine Wet End Control
Southern Paperboard Corp.

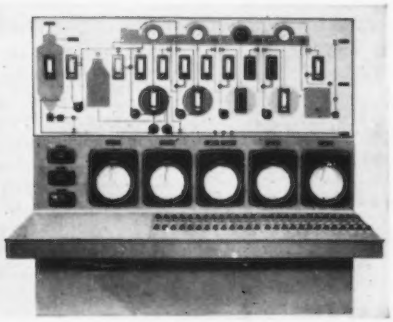


Pulp Drying Control
Riegel Carolina Corp.



Screen Room Control
Brown Co.

Bleach Plant Control
S D Warren Co



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Automatic Control Systems for every Pulp and Paper Process

From Wood to Finished Product, modern control systems by Foxboro are giving new high efficiency in pulp and paper making operations . . . producing better paper products with higher economy of time and materials.

The installations pictured here show typical installations of Foxboro instrumentation throughout pulp and paper mills. Foxboro Controls are available for all processes in the pulp and paper industry. Write for information on advanced Foxboro Systems for your operations. **The Foxboro Company, 235 Norfolk Street, Foxboro, Mass., U.S.A.**

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Pulp and Paper Mill INSTRUMENTATION

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND

Mich., and two years ago at the University of Maine.

Courses given the last two years have been of a general nature covering the usual subjects necessary for an introduction to the use of statistical methods. This year, in addition to the general course, a seminar for advanced work in statistical methods will be held.

Conference Seminar

This is to involve small conferences, of from 6 to 9 men, on the detailed analysis of specific and somewhat involved mill problems. It is to resemble very much the technical conferences that take place within mills, except that it will have the benefit of a statistician to help the business along. There will be no lectures although the presiding statistician may at times discuss statistical theory not otherwise familiar to the participants.

Finishing Panel Held for Miami Valley Supers

A panel discussion on finishing was conducted at the April 20 meeting of the Miami Valley division of the American Pulp & Paper Mill Superintendents Assn.

The program held at the Manchester hotel, Middletown, Ohio included the following panel members: Dean Newell, superintendent, Philip Carey Manufacturing Co.; James Ozias, production manager, Oxford Miami Paper Co.; William Reigers, finishing superintendent, Beckett Paper Co.; Harold Noe, finishing superintendent, Champion Paper & Fibre Co.; Russell Vannata, chief engineer, Excello Paper Co. and Howard Harrison, vice-president, Crystal Tissue Co.

The panel discussion followed a cocktail hour and dinner at the hotel.

Paper Assn. of N.Y.C. Elects Officers

At the general meeting of the Paper Assn., of New York City, which was a joint meeting participated in by both the Fine Paper Division and the Wrapping & Box Covering Division of the association, the program included presentation of annual survey figures by J. H. Londergan, Executive Secretary of the National Paper Trade Assn., the submission of the annual report of the Secretary of The Paper Assn. of New York City, and the presentation of a Panel Discussion on Merchant-Mill relations. The moderator of this discussion was Wesley P. Heilman of S. D. Warren & Co. The two mill representatives on the panel were A. Ellis Frampton, advertising manager of Hammermill Paper Co. and George Stuhr, sales manager, Southern Kraft Division of International Paper Co. The two merchants on the panel were W. G. Leathers of the Hubbs Corp. and Edward D. O'Brien of Lathrop Vandewater Paper Co.

The newly elected officers of the association, to serve until the annual meeting in 1955, are as follows: President—Joseph H. Simon, Ace Paper Co.; Treasurer—Gustave C. Indruk, re-elected, Tappen & Indruk Co., Inc.; and Secretary—Irwin Slote, re-elected.

Empire TAPPI Gives Contest Awards

The regular monthly meeting of the Eastern Division of Empire State Section of TAPPI was held at Milfranks Restaurant, Glen Falls, N. Y. on April 22.

This was the Empire State Award Contest Meeting and the following people participated in the Contest:

Miss Chung Ying Chu, a research chemist at the International Paper Co.'s Research Laboratory at Glens Falls, presented a paper in "The Effect of Adhesives Used on the Rheological Properties of Several Coating Colors."

Gordon Raheler, chemical engineer at the International Paper Co.'s Research

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Laboratory, spoke on "Pulp and Paper Mill Industrial Waste Surveys."

A. G. Bellos, a design engineer at The Sandy Hill Iron & Brass Works, Hudson Falls, N. Y. wrote on "Bleach Plant Engineering and Design."

J. Hannigan, assistant general superintendent, International Paper Co., Palmer, N. Y., presented a paper on Supercalenders, "Super Headaches."

The contest was won by Miss Chu who was awarded the $25 first prize and the privilege of presenting her paper in contest with winners from other divisions of Empire State Section of TAPPI at the annual Empire State meeting at Lake Placid, N. Y., which will be held on June 10, 11 and 12.

Second prize of $20 was won by Mr. Raheler. Third prize of $15 by Mr. Bellos and Fourth prize of $10 by Mr. Hannigan.

The judges were Grant Cole of Diamond Match Co., Plattsburg, N. Y., Robert Blakeslee of Imperial Paper and Color Corp., Glens Falls and Dallam Blandy of American Wood Board Co., Schuylerville, N. Y.

The next meeting of the division will be the annual ladies' night. Entertainment will be by G. E. House of Magic show, followed by dancing. It will be held at Milfranks on May 20.

NPTA Schedules Fall Meeting

The Fall meeting of The National Paper Trade Assn. is scheduled for the Conrad Hilton Hotel, Chicago, September 9, 10 and 11—Thursday to Saturday inclusive.

It is planned to open the exhibit on September 8 in order to give the exhibitors three full days and provide for an early closing on Saturday.

Metropolitan District to Hear Associate Editor of Paper Trade JOURNAL

The last meeting of the year of the Metropolitan District-Empire State TAPPI will be a special "Ladies Night." Mr. Monk of Fraunces Tavern has arranged a special dinner for us but the price will still be only $3 *a person.* Fraunces Tavern is at Pearl and Broad Streets, New York City.

Since this is "Ladies Night" we have arranged to have one of the outstanding women in the paper industry, Miss E. P. Nuttall, associate editor of the *Paper Trade* JOURNAL, as our speaker. She has chosen as her topic "The Nation's Fifth Industry — Its Marvelous Expanse and Unexplored Domains." Miss Nuttall's main assignment on the *Paper Trade* JOURNAL is collecting, interpreting, and boiling down into 1500 words every week the diverse factors affecting the pulp and paper industry. The letters EPN identify "Trends" as her work.

In addition to having Miss Nuttall as a speaker, a movie produced by the American Cyanamid Co. will be shown. The dinner will be served at 6:30 P.M.

AMERICAN PAPER AND PULP ASSOCIATION'S PAPER PRODUCTION RATIO REPORT

(Production as per cent of normal capacity)

COMPARATIVE WEEKLY SUMMARIES

	Mar. 27	Apr. 3	Apr. 10	Apr. 17	Apr. 24
1954	93.6	94.1	94.6	93.3r	91.5
	Mar. 28	Apr. 4	Apr. 11	Apr. 18	Apr. 25
1953	93.9	91.3	91.1	93.6	94.1

COMPARATIVE MONTHLY SUMMARIES

Year	Jan.	Feb.	Mar.	Apr	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year Avg.
1953	94.5	94.6	94.4	92.7	93.9	93.8	82.2	94.7	92.7	97.2	94.6	82.8	92.3
1954	94.2‡	94.5‡	93.7‡										

COMPARATIVE YEARLY SUMMARIES

	1947	1948	1949	1950	1951	1952	1953	1954
Year to Date	105.1	100.9	90.6	95.2	101.5	96.0	94.4	93.9
Year Average	101.7	92.1	83.7	95.8	98.0	88.6	92.3	

‡ Preliminary.
r Revised.

PAPERBOARD OPERATING RATIOS†

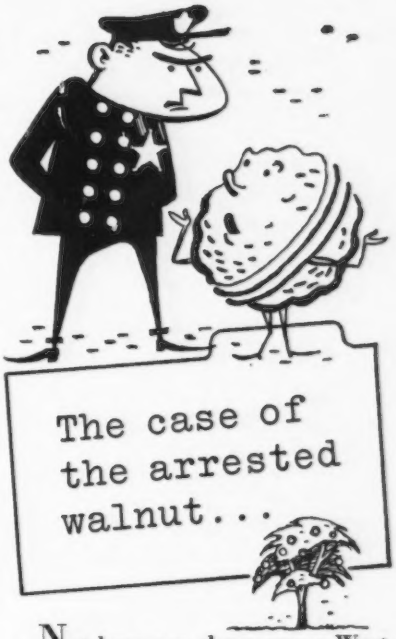
	Mar. 27	Apr. 3	Apr. 10	Apr. 17	Apr. 24
1954	90	89	89	91	87
	Mar. 28	Apr. 4	Apr. 11	Apr. 18	Apr. 25
1953	94	95	90	96	95

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug	Sept.	Oct.	Nov.	Dec.	Year Avg.
1953	91	95	95	95	96	93	81	98	94	97	94	79	93
1954	89	89	90										

All of the above data is based on tonnage reported to American Paper and Pulp Association. Does not include mills reporting to National Paperboard Association, except in isolated cases where both paper and paperboard are produced and separate tonnage figures are not readily available. Does not include mills producing newsprint exclusively.

Note: In the above tables *all* the ratios shown are on the basis of a normal 6 and 7 day capacity.

† Per cents of operation based on "Inch-Hours" reported on a 6-day basis to the National Paperboard Association.



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WANTED
Chemist or Chemical Engineer

Opportunity available for Chemist or Chemical Engineer in a mill making Bleached Soda and Sulphite Pulp, also Chlorine and Caustic. Mills located in Maine. Send resume of educational background and experience. Experience desirable but not necessary. Address reply to Penobscot Chemical Fibre Company, Great Works, Maine.
M-7

SUPERINTENDENT OF FINISHING

Eastern Pulp and Paper Manufacturer has opening for a Superintendent of Finishing. Should have 8 to 10 years' experience supervision of modern high-speed Rotary Cutters, Press Cutters and Automatic Sealing Machines, finishing Sulphite specialties. Attractive working and living conditions. Applicants should be between 30 and 45 years of age. Salary will be commensurate with experience and background. Our employees are aware of this ad. Reply to: "Paper Trade Journal", Box Number 54-156. M-7

MACHINE TENDER

FOLDING BOX BOARD MACHINE, SIX CYLINDERS. ALL FRINGE BENEFITS INCLUDED. FULL TIME EMPLOYMENT, EXCELLENT WORKING CONDITIONS, GOOD WAGES. APPLY TO MORRIS PAPER BOARD CO., 177 THIRD AVENUE, PATERSON, N. J. M-21

WANTED—Experienced Machine Tender for Tissue Mill. Plant located in Pacific Northwest. Address Box 54-142 care Paper Trade Journal. M-14

HELP WANTED

WANTED
Pulp and Paper Machinery Manufacturer's Agent or Representative for the Pacific Coast. Reply to Box 54-148 care Paper Trade Journal. M-7

SALES REPRESENTATIVE: Experienced in selling Resin Coated and Printed Paper. Knowledge of specialty bags helpful. Age 30 to 45. Progressive company—opportunity for advancement. Salary open—liberal management benefits. Send complete resume with recent snapshot to Box 53-423 care Paper Trade Journal. TF

ARE YOU A CONVERTER—and would you like a permanent connection wtih a mill in the middlewest, established for several years, making the highest grades of coated and uncoated boxboard? If so, please write at once to Box 54-162 care Paper Trade Journal. M-21

OHIO BOARD MILL requires chemical engineer or graduate pulp and paper. Under thirty five. Salary commensurate with qualifications. Submit complete information first letter. Address Box 54-160 care Paper Trade Journal. M-7

CHEMIST—To develop specialized coating for paper application. Must have previous experience in field and be familiar with all types of coating equipment. Salary commensurate with ability and experience. When replying, specify types of coatings worked on. Excellent opportunity. Address Box 54-172 care Paper Trade Journal. M-21

INDUSTRIAL-MECHANICAL ENGINEER: We have a job with a tremendous future potential for an engineer with a high degree of mechanical and executive aptitude. We operate a highly integrated paper converting and lithograph plant and need a man with ability for plant and equipment layout, who wants to shoot for a top production job. A man 30-35 preferred. Reply to J. G. Kieber, 274 North Goodman St., Rochester, 7, N. Y. M-7

ASSISTANT SUPERINTENDENT preferred with degree in Paper and Pulp making and with ten years practical experience in Fine Paper Mill. Must be familiar with Converting operations and have experience in working with standards. Must be capable of handling labor. Excellent opportunities for advancement within short time to Superintendent and Plant Manager. Write Box 54-174 care Paper Trade Journal. M-21

WANTED — Experienced Finishing Supervisors for wax paper or tissue. Plant located in Pacific Northwest. Please address reply to Box 54-164 care Paper Trade Journal. M-21

SITUATIONS WANTED

PRODUCTION SUPERINTENDENT

Twenty-five years of practical experience on large rapid running eight-cylinder machines manufacturing high grade folding boxboard & frozen food cartons of all kinds from virgin pulp and old paper stock. Aggressive, capable man, references. Address box 54-152 care The Paper Trade Journal.
M-7

Situations Wanted Advertisements continued on on page 56.

FOR SALE

CAMERON SLITTERS
1—84" Type 10-A.
1—72" Type 10-11. Shear-cut.
1—72" and 1—26" Type 10-10.
1—72" Type 8-10.
1—62" Type 9-5.
1—62" Type 40-1-AF.
1—42", 1—52", 62" and 2—72" Type 10-5.
1—42" Type 6.

OTHER SLITTERS
1—102" Langston Mill Type Shear Cut. 46" Rewind.
1—90" Johnstone Mill Type Score Cut. 44" Maximum Rewind.
1—40" and 1—60" Langston Type A Shear-cut and 1—40" and 1—50" Duplex.
1—56" Chambon, Shear-cut.
1—48" Kidder Model CH Shear-cut.
1—48" Inman Shear-cut, 48" dia. Rewind.
1—40" Kidder Model SL Shear-cut.
1—30" Meisel Shear-cut Series OP.
1—30" and 50" Model B Fales Slitter.

POWER PAPER CUTTERS
12—Seyboids, 34" 3Y, 1—50" Precision, 44", 54" and 84" 20th Century, 44", 56" and 64" Daytons, 34", 44" 8" and 64" Holyokes.
6—Oswegos, 32", 36", 38", 68", 74" & 84".

PRINTING PRESSES
1—52" 3-color Wolverine Hydroprinter Flexographic. Roll to Roll.
1—42" 4-color Kidder Aniliner. 3—Flexo and 1—Roto Units. V-S. Drive.
1—40" 4-color Hudson-Sharp Flexographic press. With Variable Sheeter and A.C. Motor.
1—36" 2-color Champlain Unit Type Rotogravure.
1—26" Champion 5-Color Rotogravure.
1—14" 3-Color Hy-Roto Rotogravure.
1—36" 2-Color Manhassett. Roll to Roll with Slitting Attachment.
1—30" 4-color Densatone Flexographic.
1—Business Form Equipment. Consisting of 12" x 18" New Era Press; 13" x 28" Carbon Processor and 12" x 17" 7-Part Collator.

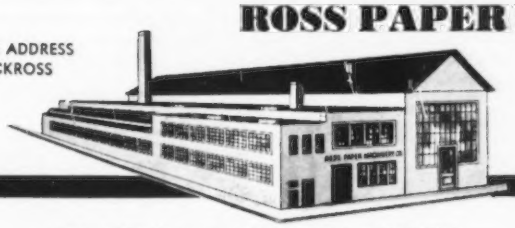
MISCELLANEOUS MACHINES
1—Lake Erie Eng. Co. #18 Acraplate Vulcanizer.
1—36" Hot Melt Coating and Laminating Machine.
1—72" Mayer Type Waxing Machine.
1—60" Hudson Sharp Household Wax Roll Machine.
2—Die Presses, 1—#34-46" x 33" Sheridan Heavy Duty, 1—Seybold 38" x 24".
6—Embossers, 1—42", 3—60", 1—72" and 1—81".
1—Sheridan Continuous Feed Embosser. Model 8D.
2—81" Dietz Toilet Paper Converters.
1—58" Paper Converting Machine Co's Single-Fold Towel Machine.
2—Potdevin Cellophane Bag Machines. Models 372 and 110.
1—Hudson-Sharp 4-Wide Single Fold Towel Machine.
1—Weber Model 2CN Satchel Bottom Cellophane Bag Machine.
1—Bagprint #18 Bag Machine.
2—Hanzel F. & S. Bag Machines. Same Range as B-10 Bagprint.
4—Model 7-24 Simplex Foil and Paper Pouch Machines.
1—Amsco Bag Heat Sealer.
1—36" Beck Rotary Sheeter with electric eye. 45" and 55" without elec. eyes.
1—G.E. Electric Eye for Back Sheeter.
1—66", 1—72" and 1—100" Hamblet Single Rotary Sheeters with Backstands and Layboy. 1—30" & 1—72" plain.
3—Schultz Automatic Rewinders. 1—18", 1—24" and 1—48". 18" for Foil or Paper.
1—72" Black-Clawson Creping Machine with Reeves Drive.
2—Paper Drinking & 3—Paper Fluted Cup Converting Machines. Foreign only.

PAPER AND PULP MILL MACHINERY
3—Dietert Moisture Tellers. With 115 V. A.C. Motors.
1—#4, 1—#8 & 1—#9 Nash Hytor Vacuum Pumps.
1—750# and 1—1200# Iron Tub Beater.
2—Nekoosa Portable Pulp Wood Peelers, Gasoline Powered.
1—7-Roll 54" Holyoke Stack of Super Calenders with AC Motor Equipment.
2—Model 8' and 1—Model 9' Wandel Dynopulper.
1—132" Two-Drum Upright Reel.
1—Valley Iron Works Voith Kneader.
2—APMEW C. S. Screens.
5—Jordans, 3—Noble & Wood Mastodon, 1—Mamouth and 1—E. D. Jones Imperial.
4—36" Dilts-Cowles #4 Horizontal Classifiners.

GIBBS-BROWER CO., INC.
Please address reply to Room 902
21 E. 40th Street, New York 16, N. Y.
Telephone Murray Hill 5-7824 M-7

ROSS PAPER MACHINERY COMPANY

CABLE ADDRESS
JACKROSS



265 PASSAIC STREET • NEWARK 4, NEW JERSEY

BUY WITH CONFIDENCE — RPM SINCE 1919 — SELL WITH CONFIDENCE

USED PAPER MAKING & CONVERTING MACHINERY

Humboldt 2-2177

AGITATOR DRIVES
2—Cleveland enclosed—3 h.p. Ratio 24 to 1.
1—Foote Bros. enclosed—15 h.p. Ratio 33 to 1.

BALERS
1—Economy Baler—60 x 32 x 96, with motor.

CALENDER ROLLS
46—Chilled Iron Rolls—Assorted sizes.

CALENDER STACKS
1—Black Clawson 90" 7 roll with 2 spare rolls.
1—Pusey & Jones 88"—7 roll Ryertex Bearings, 2 roll board.
1—Lobdell 96" 10 roll, with water cooled bearings, doctor and drive.
1—Black Clawson 82" 5 roll with doctors.
1—Black Clawson 82" 3 roll with doctors.

CLASSIFINERS
4—Dilts 36" Horizontal—Complete with 40 h.p. ball bearing motors.

CYLINDER MOLDS
2—102' face x 36" diameter, with 18" diameter rubber couches.

DAMPENER
1—Valley Micromist Unit for water finish on paper—120" deckle.

DRIVES
1—#3 Reeves anti-friction bearing.
1—Cleveland enclosed drive right angle, 7 h.p.
1—#6 Reeves vertical, ball bearing.
1—Lewellyn, 20 h.p., totally enclosed. Vertical class C-6-1. New.
1—U. S. Varied Drive Synchronous Gear Motor, 3 h.p., Ratio 2 to 1. Gear Ratio 1.82-1.
1—Reeves #3G. Horizontal. Enclosed drive.
2—Farrel Birmingham Herringbone Gear Reducers 10 h.p., 825-38.19 r.p.m.

DRYERS
2—160" face x 36" diameter.
1—130" face x 48" diameter.
16—127" face x 42" diameter.
1—126" face x 48" diameter.
1—124" face x 48" diameter.
1—116" face x 48" diameter.
1—116" face x 36" diameter, with gears and bearings.
1—116" face x 24" diameter Lead Dryer.
1—110" face x 42" diameter, with bearings.
1—104" face x 36" diameter.
1—103" face x 48" diameter.
1—102" face x 48" diameter, with bearings.
50—100" face x 48" diameter, complete with gears, 2 deck frames, bearings and steam joints.
10—88" face x 48" diameter, with frames, gears, bearings and felt roll.
3—88" face x 36" diameter, with frames, gears and bearings.
1—86" face x 36" diameter, with frames, gears and bearings.
60—74" face x 36" diameter, with gears and bearings.
26—46" face x 48" diameter, with gears, bearings and steam joints.
8—42" face x 36" diameter, with frames, gears and bearings.

DYNAPULPER
1—Rice Barton 9 ft. Dynapulper, with 54" diameter impellers. Requires 50 HP motor.

FILTERS
1—Oliver Vacuum Filter, 10' face x 5' 3" diameter. Steel vat.

FLAT SCREENS
3—8 plate Sandy Hill Roller Shoe.
2—Bagley & Sewall 8 plate.
2—16 plate Sandy Hill Roller Shoe with scrapers.

HYDRAULIC PRESS
1—Thropp 200 ton. Steam platens, 40" x 40" with pump.

JORDANS
2—E. D. Jones Pony, 3/16" stainless steel fillings—banded plugs, spare new fillings.
1—Smith & Winchester Standard with granite fillings.
1—#2 Miami anti friction bearing 150 h.p. synchronous motor with controls.
1—#6 Miami, for motor drive.

KAMYR WET END
1—Kamyr Continuous Feltless Wet End. Cylinder 59" diameter x 80" face. Steel vat—rubber couches—spare rolls and spare parts.

KNIFE GRINDERS
1—100" Hanchett Knife Grinder with motor.
1—130" Hanchett, complete with Coolant pump, 2 spare wheels and motor.
1—92" Seybold Knife Grinder.
1—Koegel Slitter Knife Grinder.

MOTORS
12—125 h.p. Westinghouse Synchronous enclosed. Brand new. 440 volt, 720 r.p.m. Forced air ventilation.

PARRY LINER
1—Parry 52" Liner, complete with motor.

PRESS SECTION
3—Complete Sections. Rolls 102" face x 16" and 18" diameter. Rubber and iron, with drives.

PULP EQUIPMENT
1—APMEW Ball Bearing Pulp Screens—30 ton capacity—outward flow.
2—Valley Voith Screw Press, size 2A.
1—Tyler Chip Screen #600, single deck.

PUMPS
44—Centrifugal Pumps, open & closed impellers. Direct connected or Belt Driven.

REELS
1—Pusey & Jones 162" drum reel, complete with unwind stand and water cooled brake.
1—Downingtown 104" 2 bowl Reel, complete with drive and adjusting devices.

ROLL GRINDER
1—Lobdell 18' Roll Grinder handles 26" maximum diameter rolls.
1—Farrell 24" x 161" motor driven Roll Grinder with crowning device.

ROLLS—PRESS, COUCH, etc.
32—Press rolls, brass and rubber covered.
14—Couch rolls, brass and rubber covered.
250—Brass and steel carrying rolls.

ROTARY DIGESTER
1—New Biggs 12½ ft. Rotary with drive—100# pressure.

ROTARY SCREENS
2—#2 Bird—Copper vat.
1—#2A Bird with copper vats.

SAVEALLS
1—Bird #5 with enclosed drive and 3 h.p. motor.
2—Bird #6A, complete, including motors. Anti friction bearings throughout.

SHEETERS
1—Moore & White Simplex 114" Sheeter with slitters—counter. Maxson layboy overlapping delivery. 8 roll backstand, motor and starter.
1—Clark 68" single knife, with layboy, 12 roll backstand & motor.
1—Cameron 124" quick change double slitter assembly for board sheeter. Complete with 16 pneumatic slitters.
1—Hamblet 100" single knife with 3 slitters. Very heavy duty.
1—Hamblet 92" duplex with Erie layboy, 12 roll backstand and motors.
1—Hamblet 81" duplex with Erie layboy, 12 roll backstand and motor.
1—Hamblet 85" Single Knife with 12 roll backstand and motor.

SLICE
1—Beloit 132" adjustable slice, complete, including stands. Slice is of all bronze construction. Operated 1000 feet per minute.

SLITTERS AND WINDERS
1—Johnstone 130", anti friction bearing equipped 50" rewind. 2500 ft. per minute.
2—Langston 112" anti friction bearings, complete with 20 h.p. motor and controls. 52" rewind. 1250 ft. per minute.
2—Cameron 62"—Model 6—24" rewind.

STEAM TURBINE
1—Terry Steam Turbine 125 h.p.—160 h.p. 50 lb. back pressure, complete with enclosed drive and Link Belt Silent Chain Drive.

STOCK PUMPS
1—Shartle 10 x 20 Single Plunger Pump.
1—Beloit 8 x 10 Triplex.
1—Moore & White 10 x 16 Triplex.
1—Moore & White 8 x 8 Triplex.
1—Shartle 8 x 18 Duplex.
4—Beloit open impeller Pumps, 5000 g.p.m. at 35' head. Anti friction bearings.

SUCTION COUCH ROLLS
1—Millspaugh 36" diameter x 234" drilled face with enclosed drive, water cooled bearings 12" suction boxes.
1—Millspaugh 156" drilled face x 22" diameter Suction Couch. Operated at 1000 ft per minute.
1—Sandusky Suction Couch, 25" diameter x 122" drilled face.
1—Sandusky 30" diameter x 210" drilled face, roller bearing equipped, complete with new pinion gear.
1—Sandusky Suction Couch 22" diameter x 122" drilled face.

SUCTION FELT ROLL
1—New Downingtown 186" drilled face x 16" diameter, with anti friction bearings and stands.

THICKENERS
1—IMPCO 5 ft. diameter Vacuum Thickener. 80" face with steel vat and spare couches. Used 3 years.
1—Hewitt 42" diameter x 88" face cylinder 16" diameter rubber couch—all anti friction bearings. Steel vat, 2 years old.

TOILET TISSUE PERFORATOR
1—Paper Converting Machine Co. Model 141, automatic 81" Perforator, ball bearing.

TRIMMERS
1—Seybold 74"—Model 12 ZG.
1—Seybold Dayton 74", with motor.
1—Seybold Dayton 64", with motor.
1—Seybold 64"—20th Century—Power back gauge.
1—Seybold 64" Model 10Z, with motor.
1—Seybold 48" Dayton—Power back gauge.
1—Seybold 38" Trimmer—power back gauge.

VACUUM PUMPS
1—Nash L-6.
1—Nash #6 Hytor.
1—Nash ¼ H-5 Vacuum Pumps.
3—Nash H-4.
3—Nash L-3, with totally enclosed 5 h.p. motor.
1—Nash #2 Hytor, with totally enclosed 7½ h.p. motor.
1—Connersville 2.1 cu.ft. per rev. With base.
2—Connersville 1.65 cu.ft. per rev. With base.
1—Connersville .75 cu.ft. per rev With base.
1—Connersville Type RSB. With base.

VOITH INLETS
2—Valley Iron Voith Inlets, adjustable 83" to 86"—brass lip, stainless steel apron.
1—Valley Iron Voith Inlet 156" with motor drive, brass construction. Operated at 1000 ft. per minute.

VORTRAPS
2—4" Stainless Steel with rubber lined heads.
1—New 8" with fittings.
1—1½" stainless steel, with valves.

WET MACHINES
1—Rogers 96" double press Wet Machine, 48" diameter cylinder—rubber couch, spare new top and bottom felts.

SITUATIONS WANTED

Technical Director of Folding Cartons manufacturer (30), wishes to relocate with aggressive organization. Technical graduate, experienced in the solution of many types of production bottlenecks, such as de-inking, de-waxing, stream pollution, etc., etc. Salary: $10,000+. Box 54-145, care Paper Trade Journal.
M-7

DESIGN, PRODUCT DEVELOPMENT & MANAGEMENT MAN

1. Management experience covers Personnel Handling & Negotiations, Purchasing, Art Work, Photography, Engraving, Rubber & Litho Plate Making, Litho, Letter Press, Rotogravure & Aniline Printing Procedures, Complete Manufacturing Storage & Shipping. Also actual installation of Work Measurement by Engineered Production Standards and Balanced-in-line Process Layouts, Mechanized Material Handling, Cost Estimating, Pricing, Cataloging Displaying, Correspondence and Customer Relations.
2. Product Development covers building lines of Commercial Envelopes, Stationery (Papeteri Boxed-Transparent Wrapt) Multi-use Printed Forms, Ruled School Supplies (Banded Fillers, Wire Coil Bound, Sewed & Memo Books & Tablets), Zipper & Regular Binders.
3. Designing covers Paper Bag, Printing, Envelope, Embossing, Slitting, Rewinding, Rotary Cutting, Wire Coil Binding, Laminating & Gumming Machinery.

Address Box 54-153 care Paper Trade Journal.
M-7

ADMINISTRATIVE MECHANICAL ENGINEER—37, with 15 years broad experience in engineering, supervision and equipment sales, all grades digester to reel, desires change for greater opportunity as operations supervisor or executive assistant. Address Box 54-161 care Paper Trade Journal. M-14

SITUATIONS WANTED

GENERAL MANAGER

of fully-integrated pulp and paper manufacturing company, now available as result of merger, seeks opportunity to demonstrate to small-to-medium-sized paper manufacturer methods used to achieve corporate earnings rate substantially above that of principal competitor and that of integrated industry nationally; available as consultant or on permanent basis. Address Box 54-167 care Paper Trade Journal. M-21

CONSULTANT—Engineer. Top grade bag man. Will instruct adjustors all repairs, manufacturing and mechanical problems, printing, trouble shooting, etc. Reasonable rates. Address Box 54-131 care Paper Trade Journal. M-7

EXECUTIVE MANAGER—Paper, Board and Conversion; seeks Change for opportunity. Highly qualified in all phases of management; administration; and production. Address Box 54-140 care Paper Trade Journal. M-28

TECHNICAL SALES OR SERVICE — Chemical Engineer, BS 1943, experienced in Product Development and liaison work with Vinyl resins, paper manufacture and converting, desires Technical Sales or Service opportunity. Address Box 54-177 care Paper Trade Journal. M-7

PULP AND PAPER GRADUATE—Twelve years experience product and machine development, process design and management. Seeks change with progressive concern. Address Box 54-176 care Paper Trade Journal. M-28

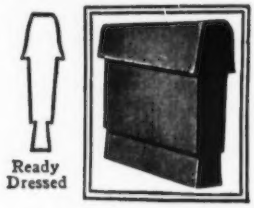
PAPER CHEMIST—BS in Chemical Engineering, experience in filter papers, seeks new position. Address Box 54-173 care Paper Trade Journal. M-7

FOR SALE

READY DRESSED

MILL COGS

LABOR SAVING TIME SAVING



The most economical filling that can be put in a mortise wheel

QUICK SERVICE
ON ALL SIZES

Write for Instruction Sheet "C" which is free

THE N. P. BOWSHER CO.
SOUTH BEND, IND.
M-7

FOR SALE—1—74" Seybold Dayton Mill type Power Cutter. THOMAS W. HALL COMPANY, Stamford, Conn. M-7

FOR SALE—80" Creper an Waxer complete with Steam Plant. All new equipment. Address Box 53-293 care Paper Trade Journal. TF

FOR SALE

GRINDERS (Roll)
Farrel, takes roll 24" x 160".
Farrel, takes roll 36" x 161".
24" x 276" centers Landis.

GRINDERS (Slitter)
2—Koegel slitter grinders.

JORDANS
2—No. 1 Jones, new 1950, with base and coupling.
1—No. 2 Emerson Junior, base and coupling, new 1948.
1—No. 1 Emerson Junior, anti-friction, 5/16" steel filling.
2—Jones Majestic.
2—Shartle Miami No. 2.
3—Jones Imperial, 3/16" stainless steel filling.
4—Emerson Junior, No. 4, anti-friction bearings.
Noble & Wood Mammoth.
2—Noble & Wood Bulldog.
Union Machine, 1/4" stainless steel filling.
Noble & Wood Mammoth Senior.
No. 2 Emerson, anti-friction.
No. 1 Emerson, No. 1 B Emerson.
No. 1 Claflin with coupling and base.
Shartle No. 1 Hydrafiner with motor.
Four Cowles Claffiners.
3—Mastodon Jordans.

KETTLES
Glass lined, steam jacketed, 150 gallons.
Glass lined, 300 gallons.
82 x 22, Glass lined, jacketed.
2 Size tanks, 300 gallons, partially jacketed.
Autoclav, used one week, 10 lb. pressure.
24 x 24 steam jacketed, fifty gallons.
Steel tank, 10 ft. dia. x 10' 6".

KNIFE GRINDERS
102" Seybold, three new stones.
100" Hanchett. 40" Springfield.
64" Seybold. 66" Berlin.
30" Bridgeport

KNOTTERS
2—Impco, print available.
3—Trimblay.

LAMINATING MACHINES
62" Beloit.
54" Laminator and Combiner.
62" Beloit.
106" Beloit, layboy and roll stands.
84" Moore & White, rebuilt.
56" Moore & White. 80" Moore & White.
94" 8-roll Moore & White, backstand, double deck, 36" roll.

MACHINE TOOLS
20" Simonds shaper.
36" Drill press.
32" Drill press.
Cincinnati No. 2 horizontal milling machine.
Pond engine lathe, 36".
Putnam lathe, 10' 6" center to center, swing 32, turns 22" from 36" bed, swings over bed 14".
Sellers planer 10' 6" x 28".

M. G. SETS
Allis Chalmers, 500 K W and controls.
Westinghouse, 100 K W.
Westinghouse 95.

MOTORS
2—G. E., 125 HP vertical squirrel cage, 550 V, 65 speed full load.
1—500 HP Westinghouse, 2300 V, 200 rpm, synchronous.
2—50 HP, 440 V. 4—100 HP, G. E., 50 V.

PULPERS
Kurt Wandell Dynapulper.
2—No. 2 Lannoye pulpers.

PUMPS (Centrifugal)
Gardner Denver, size 2½, Type EE, 350 gpm, 60 ft. head.
2300 gpm Gould, 14 ft. head with 30 HP, 440 V motor.
150 gpm Gould, 150 ft. head with 15 HP, 3600 rpm motor.
2—Frederick, 200 gallons, 80 ft. head, 25 HP, 1150 rpm, 440 V motor.
2—7500 gpm, 5 percent stock, 30 ft. head.
500 gallons, 120 ft. head, Warren.
4" x 5" Aurora, 400 gpm, 50 ft head.
500 gallon, 120 ft. head, Warren.
Jennings, 300 gallons, 35 ft. head.

PUMPS (Plunger)
7 x 16 Shartle duplex.
2—9 x 16 Downingtown, new 1951.
12 x 12 Gould triplex.
12 x 12 Bagley & Sewall triplex.
10 x 20 Black & Clawson triplex, 4 years old.
2—7 x 9 Gould.

PUMPS (Vacuum)
Nash A. L., 1 HP, 220-440 V motor.
No. 1 Nash. Nash L 6.
No. 2 Nash. Nash L 2.
No. 4 Nash.

RAG CUTTERS
Taylor Stiles Giant, size 2 B.
Perkins rag cutters Series C, No. 39.

REELS
Two bowl Rice Barton, 96".
62" Pusey & Jones drums, 42 x 162".
90" Pusey & Jones drums, 42 x 190".

REFINERS
32" Sutherland.
No. 1 Claflin with coupling and base.
4 Cowls Classifiners.
Weiner refiner.
No. 2 Haug refiner with No. 2 drainer.
No. 1 Shartle Hydrafiner, 150 HP, 440 V motor.
Shartle refiner No. 4.
Jeffrey Hammermill, size 24 with 40 HP motor.
3 Haug drainers, size 3. Morden stock maker.

SCREENS
2—Ten plate Impco, bronze vats.
1—Twelve plate Impco bronze vat.
1—Twelve plate Impco bronze vat.
1—Ten plate Sandy Hill roller shoe, new.
1—Ten plate Sandy Hill roller shoe, plates cut .012".
2—Fourteen plate Harmon.
2—Sixteen plate Packer.

SCREENS (Rotary)
4—Bird 2 A copper vats. 1—Jones Leith Walk.
1—Bird 3 A. 1—Trimbley Senior.

SCREENS (Pulp)
2—No. 4 Impco centrifugal.
2—No. 4 Impco centrifugal.
2—Trimbley.

SLICES
93" Voith. 153" Voith.153"
143" Rice Barton. 160" Beloit.
143" Voith, new. 206" Voith.

SLITTERS AND WINDERS
42" Cameron, type 6.
62" Cameron, type 95.
62" Meisel.
82" Cameron, type 10, model A.
82" Langston. 100" Type 18 Cameron.
106" Type 18 Cameron.
104" Moore & White four drum with slitter part, 7½ HP motor.
107" Moore & White, four drum, anti-friction.
146" Langston, Type D. A., anti-friction.
150" Rice Barton, two-drum, 15" dia. drums.
160" Black & Clawson, two-drum.
186" No. 19 Cameron.

ROLLS (Suction)
14½" x 99" Sandusky suction press.
14" x 100" Millspaugh suction couch.
18" x 100" Walmesley suction couch.
3—22" x 128" Downingtown suction extractor.
3—10½" x 138" Downingtown suction felt rolls.
18" x 104" Sandusky suction press.
25" x 152" Sandusky suction press.
30" x 158" Sandusky suction couch.
30" x 161" Downingtown suction couch.
30" x 170" Sandusky press.

TRIMMERS
38" Smith & Winchester.
44" Smith & Winchester, power operated back gauge.
44" Oswego. 54" Seybold, New 1940.
48" Seybold. 84" Smith & Winchester.
54" Seybold 84" Seybold.

WET MACHINES
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Midwest Fulton Mch. Co.
Testing Machines, Inc.
Thwing-Albert Instrument Co.

DUSTERS
Appleton Machine Co.
Frank W. Egan & Co.
M. W. Jenkins Sons, Inc.
E. D. Jones & Son Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Waldron, John, Corp.

DUSTING BRUSHES
M. W. Jenkins Sons, Inc.

DYESTUFFS
Ciba Company
E. I. du Pont de Nemours & Co., Inc.
Geigy Co., The
General Dyestuff Corp.

ELECTRIC HYDROMETER
Testing Machines, Inc.

ELECTRIC HYGROMETER
Thwing-Albert Instrument Co.

ELECTRICAL PRECIPITATORS
Research Corporation

EMBOSSING MACHINES
Dilts Machine Works
Egan, Frank W., & Co.
Hudson Sharp Machine Co.
Paper Converting Machine Co.
Potdevin Machine Co.
John Waldron Corp.

EMBOSSING ROLLS
The Appleton Machine Co.
Gibbs-Brower Company, Inc.
Holyoke Machine Co.
Hudson Sharp Machine Co.
B. F. Perkins & Son, Inc.
Stone, Thos. & Geo. M., Inc.
John Waldron Corp.

EMPLOYMENT SERVICE
Bixby, R. W., Inc.
Raymond. Chas. P., Service, Inc.

EMULSIFIERS
Antara Chemicals Division, General Dyestuff Corp.
Arnold, Hoffman & Co., Inc.
Nopco Chemical Co.
Rohm & Haas Company
Wyandotte Chemicals Corp.

ENZYMES
Rohm & Haas Company
Vanderbilt Co., R. T.

EVAPORATORS
Jackson & Church Co.
Murray, D. J., Mfg. Co.
Swenson Evaporator Co., Div. of Whiting Corp.
Westinghouse Electric Corp.

EXPANDERS
Mount Hope Machinery Co.

FABRICATORS
R. C. Mahon Co.
Ronningen-Petter Co.

FANS
Buffalo Pumps, Inc.
General Electric Co.
B. F. Perkins & Son, Inc.
Roots-Connersville Div.
Ross Engineering Co., J. O.
Westinghouse Electric Corp.

FEEDERS
Jeffrey Mfg. Co.
Merrick Scale Mfg. Co.

FELTS
Albany Felt Co.
Appleton Woolen Mills
Asten-Hill Mfg. Co.
Draper Bros. Corp.
Huyck & Son, F. C.
Knox Woolen Company
Lockport Felt Co.
Morey Paper Mill Supply Co.
Shuler & Benninghofen
Waterbury Felt Co.
Williams-Gray Co.

FELT CLEANERS
Antara Chemicals Division, General Dyestuff Corp.
Calgon, Inc.
Nopco Chemical Co.

FELT CONDITIONERS
Bird Machine Co.
Downingtown Mfg. Co.
Mount Hope Machinery Co.
The Sandy Hill Iron & Barss Works

FELT EXPANDERS
Mount Hope Machinery Co.

FELT GUIDES
Black Clawson Company
Downingtown Mfg. Co.
Frank W. Egan & Co.
Gilbert & Nash Co.
Moore & White Co.
The Noble & Wood Machine Co.
Mount Hope Machinery Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

FELT PRESERVERS
Mount Hope Machinery Co.

FELT SHOWERS
Ronningen-Petter Co.

FIBRE BOARD MACHINES
Black Clawson Company
Sandy Hill Iron & Brass Works

FIBRE GLASS
Pittsburgh Plate Glass Co.

FILLERS
American Cyanamid Company, Industrial Chemicals Division
J. M. Huber Corp.
A. M. Meincke & Son, Inc.
Thiele Kaolin Co.
Vanderbilt Co., R. T.
Wyandotte Chemicals Corp., Michigan Alkali Div.

FILLINGS
Bahr Bros. Mfg. Co.
John W. Bolton & Sons, Inc.
Ronningen-Petter Co.
Shartle Brothers Machine Co.

FILTER MEDIA
Hungerford & Terry, Inc.
Palmer Filter Equipt. Co.

FILTERS
Bird Machine Company
Holyoke Machine Co.
Hungerford & Terry, Inc.
Improved Machinery Inc.
Johnson Corp.
Moore & White Co.
Ronningen-Petter Co.
J. O. Ross Engrg. Corp.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Walworth Company

FILTERS, LIME MUD
Bird Machine Company

FILTER SCREENS
Ronningen-Petter Co.

FINE SCREENS
Bird Machine Company
Sandy Hill Iron & Brass Works

FITTINGS
The Bagley & Sewall Company
Crane Company
Grinnell Company
Pittsburgh Piping & Equipt. Co.
Shartle Brothers Machine Co.
Walworth Company

FLEXIBLE COUPLINGS
Dodge Manufacturing Corp.
Egan, Frank W., & Co.
Elliott Company, Inc.
Jeffrey Mfg. Co.
Shartle Brothers Machine Co.
John Waldron Corp.
Westinghouse Electric Corp.

FLOORING, GRATING AND TREADS
The Goodyear Tire & Rubber Company
Norton Co.

FLOTATION EQUIPMENT
Ronningen-Petter Co.
Walker Process Equipment, Inc.

FLOW BOXES
Lukens Steel Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

FLUID FILTERS
Ronningen-Petter Co.

FOLDERS
Emerson Mfg. Co.
Hudson Sharp Machine Co.

FORMATION TESTERS
Testing Machines, Inc.
Thwing-Albert Instrument Co.

FOURDRINIERS
Beloit Iron Works
Black Clawson Company
Downingtown Mfg. Co.
Manchester Machine Co.
The Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

FREENESS TESTERS
Testing Machines, Inc.
Williams Apparatus Co.

GASKETS
B. F. Goodrich Co.
The Goodyear Tire & Rubber Company

GEAR MOTORS
Elliott Company, Inc.
Westinghouse Electric Corp.

GEAR REDUCERS
Dodge Mfg. Corp.
Downingtown Mfg. Co.

GEAR REDUCER DRIVES
Link Belt Co.

GEARS
The Bagley & Sewall Company
Black Clawson Company
De Laval Steam Turbine Co.
Downingtown Mfg. Co.
Frank W. Egan & Co.
Farrel-Birmingham Co.
E. D. Jones & Sons Co.
Moore & White Co.
D. J. Murray Mfg. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.
Westinghouse Electric Corp.

GRAPHIC MACHINERY
Dilts Machine Works
Hudson Sharp Mch. Co.
Lyddon & Co.
Parsons & Whittemore
Potdevin Machine Co.

GRAPPLES
Blaw-Knox Company
Owen Bucket Co.
Wellman Engrg. Co.

GRATINGS
Blaw-Knox Co.

GRINDERS
Carthage Machine Co.
Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Hanchett Mfg. Co.
Lobdell United Co.
Norton Company
The Sandy Hill Iron & Brass Works

GRINDING WHEELS
Norton Company
Simonds Abrasive Co.

GUIDES
The Bagley & Sewall Company
Beloit Iron Works
Black-Clawson Co.
Downingtown Mfg. Co.
Egan, Frank W., & Co.
Gilbert & Nash Co.
The Moore & White Co.
Mount Hope Machinery Co.
Sandy Hill Iron & Brass Works
Waldron, John, Corp.

GUMMING MACHINES
Dilts Machine Works
Egan, Frank W., & Co.
Paper Converting Machine Co.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
Waldron, John, Corp.

GUMS
Hercules Powder Co., Inc.
National Starch Products, Inc.

HEAT EXCHANGERS AND RECOVERY SYSTEMS
Mahon, R. C., Co.
Westinghouse Electric Corp.

HEATING, VENTILATING & AIR CONDITIONING
The Appleton Machine Co.
E. D. Jones & Sons Co.
General Electric Co.
Jackson & Church Co.
D. J. Murray Mfg. Co.
Red-Ray Mfg. Co., Inc.
Ross Engineering Corp., J. O.
Valley Iron Works Co.
Westinghouse Electric Corp.

HONING KIT
John W. Bolton & Sons, Inc.

HOODS
Kalamazoo Sheet Metal Mfg. Co.

HOSE (Air, Water, Suction, etc.)
B. F. Goodrich Co.
The Goodyear Tire & Rubber Company

HUMECTANTS
Aktivin Division, Heyden Chemical Corp.
Arnold, Hoffman & Co., Inc.
Nopco Chemical Co.
Wyandotte Chemicals Corp., Michigan Alkali Div.

HYDRAULIC OSCILLATING SHOWERS
Ronningen-Petter Co.

HYDRAULIC TURBINES & ACCESSORIES
James Leffel Co.

IMPREGNANTS
American Cyanamid Company, Industrial Chemicals Division
Sun Oil Company
B. F. Goodrich Chemical Co.

INDENTING MACHINES
Dilts Machine Works

INDUSTRIAL CONTROL
Westinghouse Electric Corp.

INDUSTRIAL TIRES
B. F. Goodrich Co.

INDUSTRIAL TRACTORS
Towmotor Corp.

INK (Flexographic)
Bensing Bros. & Deeney

INKOMETER
Thwing-Albert Instrument Co.

INSTRUMENTS, TESTING AND MEASURING
Black-Clawson Co.
General Electric Co.
W. & L. E. Gurley
B. F. Perkins & Son
Taylor Instrument Cos.

Testing Machines, Inc.
Thwing-Albert Instrument Co.
Tracerlab, Inc.
Westinghouse Electric Corp.

INSULATION
Insul-Mastic Corp. of America

JACKETS
Emerson Mfg. Co.

JOINTS
The Bagley & Sewall Company
Beloit Iron Works
Cram Associates
Downingtown Mfg. Co.
Johnson Corp.
Moore & White Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

JORDAN BARS
Ronningen-Petter Co.

JORDANS
Emerson Mfg. Co.
Ronningen-Petter Co.
Shartle Brothers Machine Co.

JORDAN FILLINGS
Appleton Machine Co.
Bahr Bros. Manufacturing Co.
John W. Bolton & Sons, Inc.
E. D. Jones & Sons Co.
Ronningen-Petter Co.
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Valley Iron Works Co.

KILNS
Jackson & Church Co.
F. L. Smidth & Co.

KNIVES
Black Clawson Company
John W. Bolton & Sons, Inc.
Dilts Machine Works, Inc.
Hamblet Machine Co.
E. D. Jones & Sons Co.
The Moore & White Co.
Shartle Brothers Machine Co.
Simonds Saw & Steel Co.
Taylor Stiles & Co.
Valley Iron Works Co.

KNOTTERS
Black Clawson Company
Improved Machinery, Inc.
Sandy Hill Iron & Brass Works

LABORATORY CORRUGATOR
Testing Machines, Inc.
Thwing-Albert Instrument Co.

LABORATORY EQUIPMENT
Appleton Machine Co.
Bauer Brothers Co.
Bird Machine Company
Cady & Co., E. J.
Dilts Machine Works
Downingtown Mfg. Co.
W. & L. E. Gurley
Egan, Frank W., & Co.
Hermann Mfg. Co.
Jackson & Church Co.
E. D. Jones & Sons Co.
Ronningen-Petter Co.
Shartle Brothers Machine Co.
Taylor Instrument Companies
Testing Machines, Inc.
Thwing-Albert Instrument Co.
Valley Iron Works Co.
Waldron, John, Corp.

LAMINATING MACHINES
The Bagley & Sewall Company
Dilts Machine Works
Egan, Frank W., & Co.
Hudson Sharp Machine Co.
Paper Converting Machine Co.
Potdevin Machine Co.
Waldron John, Corp

LAY BOYS
Dilts Machine Works
Gibbs-Brower Company, Inc.
Hamblet Machine Co.
Moore & White Co.

LINTER PULP
Hercules Powder Co., Inc.

LUBRICANTS
Cities Service Oil Co.
Gulf Oil Corp.
Houghton & Co.
Sinclair Refining Co.
Socony-Vacuum Oil Co.
The Texas Company

MACHINERY, CARBON PAPER
Haida Engineering Co.

MAGAZINE REELS
Dilts Machine Works

MAGNETIC SEPARATORS
Bauer Bros. Co.
Emerson Mfg. Co.
Shartle Brothers Machine Co.

MATERIALS HANDLING
Dilts Machine Works
Downingtown Mfg. Co.
Jeffery Mfg. Co.
Link Belt Co.
Shartle Bros. Mch. Co.
Towmotor Corp.
The Wellman Engrg. Co.

MICROMETERS & CALIPERS
Cady & Co., E. J.
Farrel-Birmingham Co.
Lobdell Co.
Testing Machines, Inc.

MIXERS
Jackson & Church Co.
Mixing Equipment Co.
Walker Process Equipment, Inc.

MICRO-CRYSTALLINE WAXES
Sun Oil Company

MOISTURE CONTENT CONTROL
Testing Machines, Inc.
Vapo Systems Co.

MOISTURE METERS
Testing Machines, Inc.

MOTORS
Allis Chalmers Mfg. Co.
Elliott Company
Moorhead Elec. Machy. Co.

MOTORS AND GENERATORS
Elliott Company, Inc.
General Electric Company
Moorhead Elec. Machy. Co.
Reliance Electric & Engrg. Co.
Westinghouse Electric Corp.

NICKEL AND NICKEL ALLOYS
The International Nickel Co.

PACKING BOXES
Johnson Corporation
The Moore & White Co.
Shartle Brothers Machine Co.

PAPER CONDITIONERS
Vapo Systems Co

PAPER MACHINE DRIVES
The Bagley & Sewall Company
Beloit Iron Works
Black-Clawson Co.
Dowington Mfg. Co.
Manchester Machine Co.
Moore & White Co.
Sandy Hill Iron & Brass Works
Westinghouse Electric Corp.

PAPER MACHINES
The Bagley & Sewall Company
Beloit Iron Works
Black-Clawson Company
Downingtown Mfg. Co.
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Lukenweld
Manchester Machine Co.
Moore & White Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machinery Corp.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

PAPER MACHINE SLICES
Black-Clawson Company
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
The Moore & White Co.
The Sandy Hill Iron & Brass Works
Valley Iron Works Co.

PAPER MILL MACHINERY
Ronningen-Petter Co.

PAPER TUBE MACHINERY
Dietz Machine Works
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
Hudson Sharp Machine Co.
Langston Co., Samuel M.
Paper Converting Machine Co.

PARAFFINE WAXES
Sun Oil Company

PARAFFIN WAX EMULSIONS
American Cyanamid Co., Ind. Chem. Div.
Arnold, Hoffman & Co., Inc.
Hercules Powder Co., Inc.
Nopco Chemical Co.

PASTING MACHINES
Beloit Iron Works
Black-Clawson Company
Dilts Machine Works
Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
Murray, D. J., Mfg. Co.
Moore & White Co.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John

PEBBLE MILLS
F. L. Smidth & Co.

pH METERS
Testing Machines, Inc.
Thwing-Albert Instrument Co.

PHOTO GRAVURE ROLLS
Stone, Thos. & Geo. M., Inc.

PIPE
Aluminum Co. of America
Armco Drainage & Metal Products, Inc.
Babcox & Wilcox Co.
Crane Company
Grinnell Company
National Tube Co.
Walworth Company

PIPE FABRICATORS
Pittsburgh Piping & Equipt. Co
Ronningen-Petter Co.

PIPE FITTINGS
Aluminum Co. of America
Armco Drainage & Metal Products, Inc.
Crane Company
Grinnell Company
Pittsburgh Piping & Equipt. Co
Walworth Co.

PIPING, HIGH PRESSURE
Pittsburgh Piping & Equipt. Co.

PIPING (Pilowald Lines)
Goodyear Tire & Rubber Co.

PITCH CONTROL
American Cyanamid Company, Industrial Chemicals Division
Antara Chemicals Division, General Dyestuff Corp.
Monsanto Chemical Company
National Aluminate Corp.
Nopco Chemical Co.
Rohm & Haas Company

PLASTICIZERS
American Cyanamid Company Industrial Chemicals Company
Aktivin Division, Heyden Chemical Corp.
Arnold, Hoffman & Co., Inc.
B. F. Goodrich Chemical Co.
Jackson & Church Co.
Naugatuck Chemical Division of U. S. Rubber Co.
Nopco Chemical Co.
Rohm & Haas Company

PLATERS
Gibbs-Brower Company, Inc.
Perkins & Son, Inc., B. F

PLATES
Armco Steel Corp.
Babcock & Wilcox Co.
Emerson Mfg. Co.
Lukenweld Division
Lukens Steel Company
L. O. Ross Engrg. Corp.
Timken Roller Bearing Co.

PLUGS
The Appleton Machine Co.
Black Clawson Company
Emerson Mfg. Co.
E. D. Jones & Sons Co.
Shartle Brothers Machine Co.

POPE TYPE REELS
Black-Clawson Company
Downingtown Mfg. Co.
Egan, Frank W., & Co.
Manchester Machine Co.
Moore & White Co.
Sandy Hill Iron & Brass Works

PRESERVATIVES
Antara Chemicals Division, General Dyestuff Corp.
E. I. du Pont de Nemours & Co.

PRESS ROLLS
Beloit Iron Works
Black-Clawson Co.
Downingtown Mfg. Co.
Goodrich, B. F., Company, Inc.
Manchester Machine Co.
Moore & White Co.
Sandy Hill Iron & Brass Works
Stowe-Woodward Inc.

PRESSURE FILTERS
Holyoke Machine Co.
Hungerford & Terry, Inc.
Jackson & Church Co.
Ronningen-Petter Co.
Sandy Hill Iron & Brass Works

PRESSURE VESSELS
Chicago Bridge & Iron Co.
Mahon, R. C., Co.
A. O. Smith Corp.

PRESSES
Beloit Iron Works
Black-Clawson Company
Downingtown Mfg. Co.
Dietz Machine Works
Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
Heinrich, H. H., Co.
Hudson-Sharp Machine Co.
Jackson & Church Co.
Manchester Machine Co.
The Moore & White Co.
Paper Converting Machine Co.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Testing Machines, Inc.
Valley Iron Works Co.
Waldron Corp., John
H. G. Weber & Co., Inc.

PRINTING ROLLS
Stone, Thos. & Geo. M., Inc.

PROTECTIVE COATINGS
Insul-Mastic Corp. of America

PULLEYS
Bird Machine Company
Black-Clawson Co.
Dodge Mfg. Corp.
Horton Mfg. Co., Inc.
Sandy Hill Iron & Brass Works

PULP CLASSIFIER
The Bauer Bros. Co.
Testing Machines, Inc.
Thwing-Albert Instrument Co.

PULP CLEANERS
Bauer Bros. Co.
Bird Machine Co.
Nichols Engrg. & Research Corp.
Sandy Hill Iron & Brass Works
Shartle Bros. Machine Co.

PULP REFINERS
Emerson Mfg. Co.
Shartle Bros. Machine Co.

PULP SCREENS
Bird Machine Co.
Murray, D. J., Mfg. Co.
Sandy Hill Iron & Brass Works
Shartle Bros. Machine Co.

PULP STOCK VALVES
Crane Company
Grinnell Company
Murray, D. J., Mfg. Co.
Record Fdy. & Mach. Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.

PULP WASHERS
Mundt, Chas. & Sons
Sandy Hill Iron & Brass Works
Shartle Bros. Machine Co.

PULPERS
Apmew, Inc.
Bauer Brothers Co.
Cowles Company
Curlator Corp.
Dilts Machine Works
Downingtown Mfg. Co.
E. D. Jones & Sons Co.
Midwest Fulton Mch. Co.
Morden Machines Co.
Shartle Brothers Machine Co.

PULPS
Brown Company
Gottesman & Co., Inc.
Lyddon & Co. (America), Inc.
Parsons & Whittemore, Inc.
Perkins-Goodwin Co.
Price & Pierce, Ltd.
Pulp and Paper Trading Co.
Restigouche Co., Ltd.

PULPSTONES
Norton Company

PULP TESTERS
Testing Machines, Inc.

PULP TREATING
Curlator Corp.

PULVERIZING MILLS
Jeffery Mfg. Co.
F. L. Smidth & Co.

PUMP VALVE BALLS
Stowe-Woodward Inc.

PUMPS
Allis Chalmers Mfg. Co.
Apmew, Inc.
The Bagley & Sewall Company
Beloit Iron Works
Black Clawson Company
Buffalo Pumps, Inc.
DeLaval Steam Turbine Co
Downingtown Mfg. Co.
Gibbs-Brower Company, Inc.
Johnson Corp.
Moore & White Co.
Nash Engineering Co.
Read Standard Corp.
Ronningen-Petter Co.
Roots Connersville Blower Corp.
J. J. Ross Company
Ross Paper Machy. Corp.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.

RADIANT BURNERS
Red-Ray Mfg. Co., Inc.

RAG COOKING PROCESSES
General Dyestuff Corp.
Rohm & Haas Company

RAG CUTTERS
Gibbs-Brower Company, Inc.
B. F. Perkins & Son, Inc.
Taylor-Stiles & Co.

RECOVERY SYSTEMS
Babcock & Wilson Co.
Chicago Bridge & Iron Co.
Moore & White Co.
D. J. Murray Mfg. Co.
Peabody Engrg. Corp.
Pusey & Jones Corp.
Ross Engineering Corp., J. O.
Valley Iron Works Co.
Vulcan Copper & Supply Co.

REELS
The Appleton Machine Co.
The Bagley & Sewall Company
Beloit Iron Works
Black Clawson Company
Dilts Machine Works (Kohler Systems)
Egan, Frank W., & Co.
Downingtown Mfg. Co.
Hudson-Sharp Mch. Co.
Manchester Machine Co.
Moore & White Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
The Smith & Winchester Mfg. Co.
Waldron, John, Corp.

REFINERS
Appleton Machine Co.
Bahr Brothers Mfg. Co.
Bauer Brothers Co.
Curlator Corp.
Dilts Machine Works
Downingtown Mfg. Co.
Gibbs-Brower Company, Inc.
Hermann Mfg. Co.
Jackson & Church Co.
E. D. Jones & Sons Co.
Morden Machines Co.
Murray, D. J., Mfg. Co.
Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Sutherland Refiner Corp.
Valley Iron Works

REFRACTORIES
Harbison-Walker Refractories Co.

REGULATORS
Airmatic Valve, Inc.
Apmew, Inc.
Bird Machine Company
General Electric Co.
Improved Machinery Inc.
Johnson Corp.
Poirier Control Company
Shartle Brothers Machine Co.
Taylor Instrument Companies
Westinghouse Electric Corp.

RESINS
American Cyanamid Company, Plastics & Resins Division
Borden Company
The Dow Chemical Company
B. F. Goodrich Chemical Co.
The Goodyear Tire & Rubber Company
Hercules Powder Co.
Koppers Company, Inc.
Monsanto Chemical Company
Naugatuck Chemical Division of U. S. Rubber Co.
Nopco Chemical Co.
Pennsylvania Indust. Chem. Corp.
Rohm & Haas Company

ROLLS
Appleton Machine Co.
The Bagley & Sewall Company
Beloit Iron Works
Black Clawson Company
Dilts Machine Works
Downingtown Mfg. Co.
Frank W. Egan & Co.
Emerson Mfg. Co.
Farrel-Birmingham Co.
Gibbs-Brower Company, Inc.
B. F. Goodrich Co.
Holyoke Machine Co.
Lindsay Wire Weaving Co.
Lobdell United Co.
Manchester Machine Co.
The Moore & White Co.
D. J. Murray Mfg. Co.
Perkins, B. F., & Sons Co.
Pusey & Jones Corp.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Smith & Winchester Mfg. Co.
Stone, Thos. & Geo. M., Inc.
Stowe-Woodward Inc.
Tyer Rubber Co.
U. S. Rubber Co.
Valley Iron Works Co.
Waldron Corp., John

ROLL COVERS
B. F. Goodrich Co.
The Goodyear Tire & Rubber Company
Stowe-Woodward Inc.
Tyer Rubber Co.
U. S. Rubber Co.

ROLL HANDLING EQUIPMENT
Dilts Machine Works

ROLL STANDS
Cameron Machine Co.
Dilts Machine Works
Frank W. Egan & Co.
Moore & White Co.
The Sandy Hill Iron & Brass Works
John Waldron Corp.
H. G. Weber & Co., Inc.

ROPE CARRIERS
Black Clawson Co.
Downingtown Mfg. Co.
The Moore & White Co.
The Sandy Hill Iron & Brass Works

ROTARY KILNS
F. L. Smidth & Co.

ROTARY SCREENS
Bird Machine Company

ROTARY STEAM JOINTS
Johnson Corp.
The Moore & White Co.
Sandy Hill Iron & Brass Works
Shartle Bros. Mch. Co.

RUBBER COVERED ROLLS
Stowe-Woodward Inc.
Tyer Rubber Co.

RUBBER PRODUCTS
B. F. Goodrich Co.
The Goodyear Tire & Rubber Company
Stowe-Woodward Inc.
Tyer Rubber Co.

SAMPLE CUTTER
Testing Machines, Inc.
Thwing-Albert Instrument Co.

SATURANTS
B. F. Goodrich Chemical Co.

SATURATING MACHINES
Dilts Machine Works
Frank W. Egan & Co.
Gibbs-Brower Company, Inc.
Moore & White Co.
Potdevin Machine Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Waldron Corp., John
Weber, Herman G.

SAVEALLS
Bird Machine Company
Bulkley, Dunton Processes, Inc.
Chicago Bridge & Iron Co.
Improved Paper Machinery Corp.
Moore & White Co.
Ronningen-Petter Co.
Shartle Bros. Machine Co.
Walker Process Equipment, Inc.

SAWS
Simonds Saw & Steel Co.
Moore & White Co.

SCALES
Cady & Co., E. J.
Merrick Scale Mfg. Co.
Testing Machines, Inc.

SCREEN PLATES
Bird Machine Company
Fitchburg Screen Plate Co.
Magnus Metal Corp.
Morey Paner Mill Supply Co.
Testing Machines, Inc.

SCREENS
Appleton Wire Works
Appleton Machine Company
The Bagley & Sewall Company
Bird Machine Company
Carthage Machine Co.
Dilts Machine Works, Inc.
Downingtown Mfg. Co.
Gibbs-Brower Company, Inc.
E. D. Jones & Sons Co.
Moore & White Co.
Murray, D. J., Mfg. Co.
J. J. Ross Company
Ross Paper Machy. Co.
The Sandy Hill Iron & Brass Works
Shartle Brothers Machine Co.
Valley Iron Works Co.

SCREENS, CHIP (Vibrating)
Link Belt Co.

SCREENS (Rotary)
Bird Machine Company

SHAKES
Black Clawson Company
Downingtown Mfg. Co.

SHAKE STICKS
Westinghouse Electric Corp.

SHEET MACHINES
Downingtown Mfg. Co.
Gibbs-Brower Company, Inc.
Thomas W. Hall Co.
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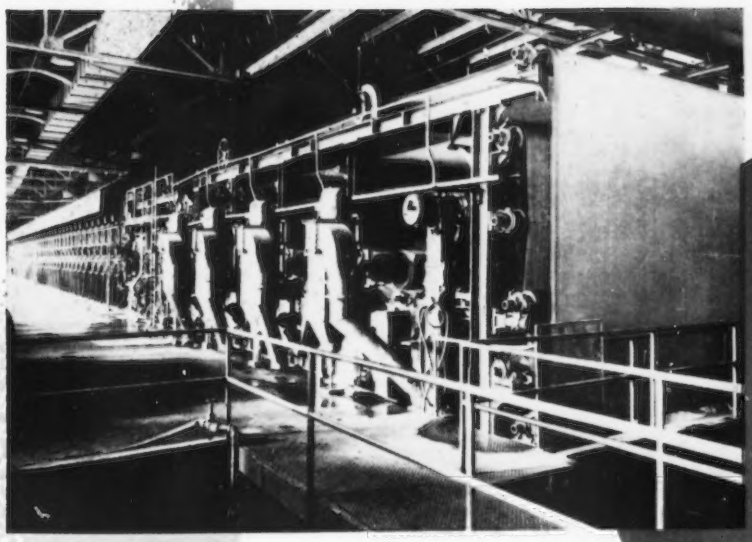

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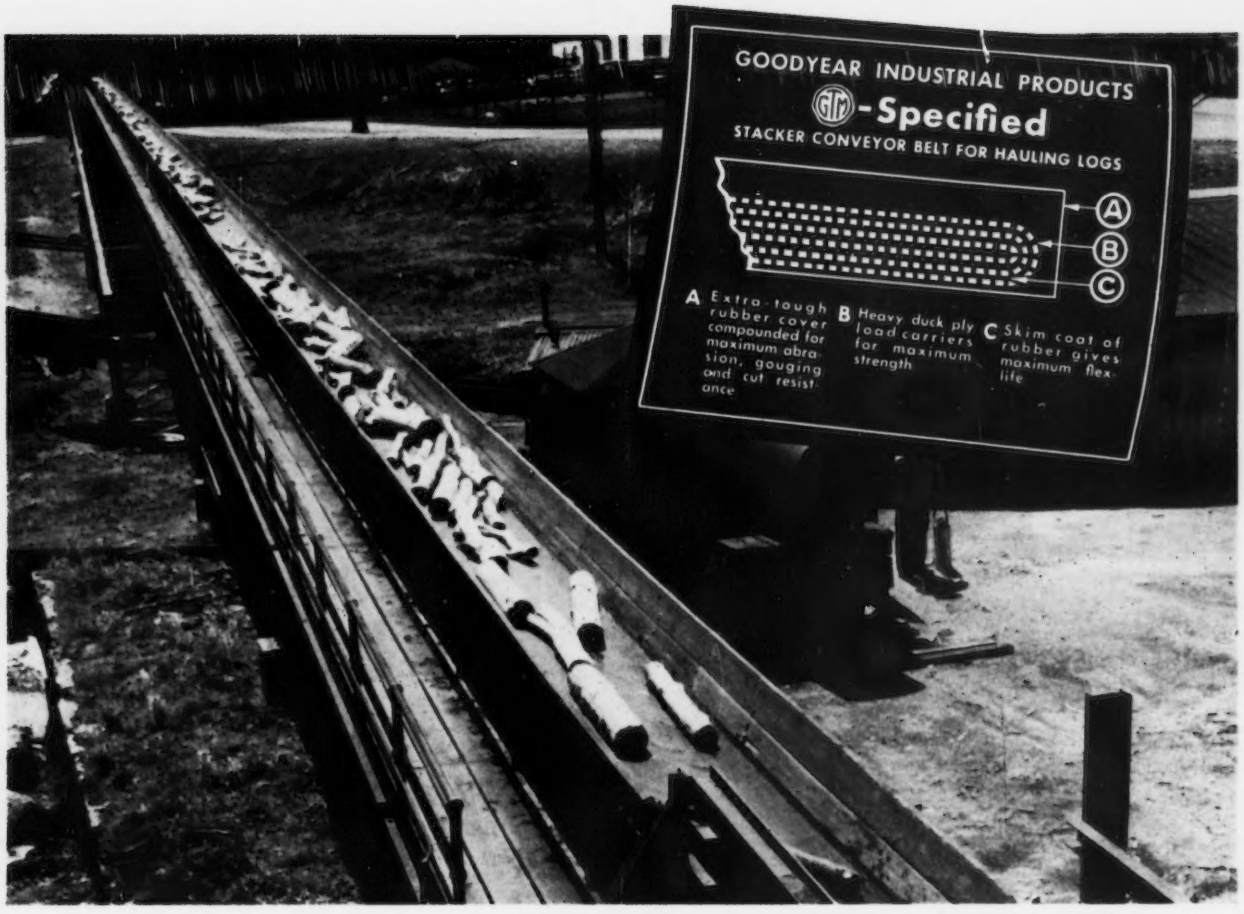
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